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Seventh annual progress report of the Board of Auditors on the implementation of the United Nations enterprise resource planning system

Note by the Secretary-General

The Secretary-General has the honour to transmit to the General Assembly a letter dated 24 July 2018 from the Chair of the Board of Auditors transmitting the report of the Board on the progress in the implementation of the enterprise resource planning system (Umoja).

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Letter of transmittal

Letter dated 24 July 2018 from the Chair of the Board of Auditors addressed to the President of the General Assembly

I have the honour to transmit to you the seventh report of the Board of Auditors on the implementation of the enterprise resource planning system.

(*Signed*) Rajiv **Mehrishi**
Comptroller and Auditor General of India
Chair of the Board of Auditors
(Lead Auditor)

Seventh annual progress report of the Board Auditors on the implementation of the United Nations enterprise resource planning system

Summary

1. In July 2006, by its resolution 60/283, the General Assembly endorsed the Secretary-General's proposal to implement an enterprise resource planning system (Umoja) across the United Nations Secretariat to replace ageing legacy systems such as the Integrated Management Information System. Umoja is central to the modernization of the business administration of the United Nations. The complex, high-value project is aimed at modernizing a wide range of business processes and systems that are crucial to the efficient and effective management of the Organization.

2. In December 2011, in its resolution 66/246, the General Assembly requested the Advisory Committee on Administrative and Budgetary Questions to request the Board of Auditors to conduct a comprehensive audit of the implementation of the Umoja project and to report annually to the Assembly starting at the main part of its sixty-seventh session.

3. In a series of reports since 2012 (A/67/164, A/68/151, A/69/158, A/70/158, A/71/180 and A/72/157), the Board of Auditors submitted information on the progress made in the implementation of the Umoja project. The original timeline and budget approved in 2008 envisaged deploying Umoja by the end of 2012 at a cost of $248.3 million. However, the implementation plans had been substantially revised on several occasions, and the deployment of full functionality is at present not expected until 2019. The current approved budget for the project up to the end of 2019 was $528.22 million, and the total expenditure up to 31 December 2017 was $439.4 million.

4. Umoja was implemented in different parts of the Organization (clusters), with functionality split into three phases, as follows.

(a) **Umoja Foundation**. This functionality, mainly finance and procurement processes, was fully deployed across peacekeeping operations from November 2013, in special political missions from March 2014 and across remaining United Nations Secretariat entities in two clusters from June and November 2015;

(b) **Umoja Extension 1 (UE1)**. Comprising mainly payroll and human resources management processes, including travel, this functionality was deployed across Secretariat entities and peacekeeping operations in two clusters from June and November 2015. Most non-peacekeeping Secretariat entities therefore received Umoja Foundation and UE1 functionality at the same time (Umoja Integration);

(c) **Umoja Extension 2 (UE2)**. This functionality will include key business processes, such as budget formulation, fundraising and implementing partners, programme management, supply chain management and conference and event management, and is currently scheduled to be deployed by the end of 2018. Both quantitative and qualitative benefits are expected to accrue from the deployment of UE2.

5. This is the Board's seventh annual review of progress of the implementation of Umoja. The report mainly covers matters relating to project governance, estimates of benefit realization and the total cost of ownership of the project, progress in the deployment of the solution and mainstreaming of the application. The report also covers the resolution of user problems and the management of change requests. In addition, the present report contains the results of the IT audit of the Umoja application

in the areas of user access provisioning, controls for segregation of duties, IT application controls and data quality.

Key findings

Project governance

6. While appreciating the fact that development of Umoja is led from the top by the Chef de Cabinet and the Under-Secretary-General for Management (project owner and Chair of the Steering Committee), the Board noted that, in 2017, the Management Committee met twice, in June and December, while the Umoja Steering Committee met regularly from January to April but met only twice thereafter, in August and October 2017. The Board is of the view that the Management Committee and Steering Committee should continue to take the lead in guiding Umoja implementation.

Managing benefits realization

7. The Board notes that end-to-end process management is a significant change triggered by Umoja. With the impending stabilization of UE1 and deployment of UE2, there are likely to be greater opportunities for realizing qualitative benefits in future.

8. The Board appreciates the efforts made by process owners to identify business processes and build a basis for the quantum of benefits realized from year to year. The Board found that the estimates of the quantum of benefits realized by the reduction of posts were in order. Regarding estimates of non-post reductions relating to the supply chain, which were based on top-down analysis, as well as estimates of benefits resulting from IT streams, the Board was not in a position to validate such estimated quantitative figures in the absence of a documented basis for the figures. The Board was also informed that the peacekeeping budgets were still being formulated and that, on the basis of the information available at the time of preparation of the audit, most of the peacekeeping missions had not identified Umoja benefits.

9. The Board observed that there was scope for improvement in maintaining documentation and preserving the institutional memory of the overall process of benefit realization and that there was no continuity in earmarking resources to monitor that process. The Board also observed that there was no documented plan in place to aid the Secretariat in establishing a clear and transparent record of the realization of qualitative and quantitative Umoja benefits.

Total cost of ownership

10. In the ninth progress report of the Secretary-General on the enterprise resource planning project (A/72/397), the total cost of ownership was estimated at $1,402 million over its estimated life cycle (through 2030). The total cost of ownership comprises direct cost, indirect cost, training cost and maintenance cost.

11. The Board reviewed the indirect cost calculations and was of the view that the above-mentioned indirect cost figure through 2017 generally corresponded with the cost estimates of those resources used in deployments. However, the Board is of the view that there is a likelihood of continuous improvements after 2019 which may involve further indirect cost. The Administration informed the Board that it did not include estimates of that further indirect cost in the report in view of the difficulty of accurately estimating it.

12. The Board noted that the Administration has automated the measurement of training costs based on the available training details. However, owing to the non-availability of reliable training data for prior periods, that measurement is based on assumptions. The Board also noted that the estimate of maintenance costs from

2020 onwards was based on the costs of annual maintenance as projected in the report of the Secretary-General on the status of implementation of the information and communications technology strategy for the United Nations (A/72/755/Rev.1). However, the Board is of the view that this estimate is likely to change because of the need to acquire new software licences as usage increases over time. The Administration informed the Board that it does not have a basis for estimating such costs at this stage and agreed to conduct a general review to ensure that there are enough licences for all new functionalities.

Application controls

13. Based on an analysis of Umoja data, the Board observed that 168 staff members took uncertified sick leave in excess of the normal seven-day limit during the period from 1 April 2017 to 5 March 2018. The Board analysed the latest Umoja reports on absence quotas for staff members located in New York and noted 147 cases of negative balances as on 5 March 2018 in leave quota types that should not have had negative balances. The Administration informed the Board that there is an outstanding clean-up action required to address the cases highlighted in audit.

User access provisioning

14. As of 18 February 2018, there were 2,996 unlocked user accounts in Umoja for staff members who had separated in 2016 and 2017, all with valid end-dates of "31.12.9999". Of those 2,996 former staff members with active user IDs, 1,105 had accessed Umoja after separation, 236 had accessed Umoja more than 90 days after separation and 19 had accessed Umoja more than one year after separation.

15. There were 290 former staff members with active user IDs who had been assigned roles other than employee self-service roles (1,344 different roles under the business intelligence, human resources, financial accounting, funds management, technical, receive to distribute, source to acquire, customer service or real estate modules), 139 of whom had accessed Umoja after separation.

16. There were no defined centralized procedures to deactivate Umoja access. The Board stresses the need for better coordination among the Office for Human Resources Management, the Office of Information and Communications Technology and the Umoja office so that the continuing access of separated employees can be reviewed centrally at regular intervals.

Access management

17. According to the relevant control procedure,[a] the access rights should be removed in case a service is not accessed for more than three consecutive months. The Board observed that although as of 18 February 2018, 469 users had not logged on to Umoja for more than 90 days, their accounts remained active in Umoja and Unite. The Board also noted an absence of annual reviews of access management.

Segregation of duties

18. The Umoja office, in consultation with process owners, had developed a detailed enterprise role guide that defined the combinations of roles which, if assigned to the same user, resulted in segregation of duties conflicts. The Board analysed the enterprise role assignments for any possible segregation of duties conflicts as defined by the enterprise role guide and found that there were 1,146 users with 3,948 conflicting roles.

Business continuity and disaster recovery planning

19. The Board noted that a disaster recovery exercise had been conducted with the objectives, inter alia, of validating the failover/failback process and procedures for Umoja components and discovering any gaps; verifying the readiness of the Umoja disaster recovery infrastructure; and training the team in preparation for a real disaster scenario, which was simulated on 6 May and 3 June 2017. The exercise also aimed to check if the recovery time objective of 4 hours, the recovery point objective of 10 minutes and the maximum agreed downtime of eight hours could be met.

20. The Board observed that the actual recovery time that was achieved in the exercise was 18 hours and 35 minutes for the failover exercise, while it was 7 hours and 15 minutes for the failback exercise. In addition, it was noted that the actual recovery point in both the exercises was 0 minutes. Thus, while the recovery point objective was met in both the failover and the failback exercises, the recovery time objective was not met in either exercise. Moreover, the maximum downtime was breached in respect of the failover exercise, while it was adhered to in the failback exercise. The Board also noted that the report of the exercise included both a list of lessons learned during the exercise and actionable items and recommendations for improvement that would be incorporated into the Umoja disaster recovery plan.

Umoja deployment

21. The cluster 5 deployments of UE1 included the implementation of Umoja for national staff and individual uniformed personnel in special political and peacekeeping missions in November 2016. In addition, the International Civil Service Commission (ICSC) compensation package, phases 1, 2 and 3, were implemented in November 2016, January 2017 and January 2018, respectively, while the financial statements module of volume I for the United Nations Environment Programme (UNEP), the United Nations Programme for Human Settlements (UN-Habitat), the United Nations Office of Drugs and Crime (UNODC), the international tribunals and the International Trade Centre (ITC) and phase 1 of supply chain management, were implemented by September 2017. The Board was informed by process owners that they were largely satisfied with the implemented functionalities. The Board noted that the dates of implementation of a few modules of UE2 might extend into 2019, which according to the Administration was owing to the necessity to mitigate associated risks.

Business intelligence

22. The Board noticed that the average frequency of usage of existing business intelligence reports showed a decreasing trend in the later months of 2017. This trend was in contrast to the increasing number of users in Umoja and the addition of new functionalities in 2017. For addressing issues related to business intelligence, the Umoja business intelligence team had prepared a detailed implementation plan in July 2017, including estimates of resources. The Board noted that the work related to enrichments in the semantic layers[b] relating to the general ledger, accounts receivable, payroll, real estate and supply chain functionalities, which had been planned during 2017, had yet to be initiated.

Change management

23. The Board's analysis of the change request database indicated that, of the 235 change request items requested by business users that were pending for review, 41 change requests (17 per cent) had been pending for more than one year. The Board noted the need to prioritize the change request items according to their potential impact.

24. The Board was informed that the Umoja team was planning to implement the Change Request Management (ChaRM) in the future. The Board is of the view that implementation of SAP-based integrated monitoring through ChaRM will enhance the monitoring of the implementation of the change requests.

Mainstreaming Umoja

25. The Board is of the view that it is important to consider various factors in the mainstreaming plan, such as the ongoing reform agenda, the timelines of UE2 deployments and the large scope for continuous improvements in Umoja functionalities. Umoja stabilization may require some time after full functionality deployments. Moreover, the scope for improvements in functionality through a continuous improvement programme is likely to extend beyond the mandated project period.

Recommendations

26. The Board has made recommendations throughout the report. The main recommendations are as follows:

(a) **The Administration should develop an Umoja benefit realization plan, with an emphasis on improvements resulting from Umoja-based business processes and monitoring of those processes to leverage further benefit realization. Adequate documentation supporting the computation of quantitative figures for benefit realization should be maintained;**

(b) **The Administration should identify a coordinating division/unit as the primary process owner of benefit realization responsible for:**

(i) **Monitoring the process of benefit realization;**

(ii) **Engaging stakeholders of the various units and divisions;**

(iii) **Continuous monitoring;**

(c) **The Administration should monitor the accuracy of the corrective action put into production to ensure that the Umoja system does not allow the limit of uncertified sick leave days that a staff member may take in a year to be exceeded;**

(d) **The Administration should analyse the negative balances identified by the Board for each type of leave quota and rectify the Umoja human capital management module through change requests, as applicable;**

(e) **The Administration should ensure that properly documented reviews of user access provisioning are mandatorily carried out by security liaison officers with a frequency to be determined by Umoja process owners;**

(f) **The Administration should take measures to ensure that continuing access to Umoja by all separated and retired employees is terminated immediately, except for self-service requirements as needed;**

(g) **All the actionable items of the report on the disaster recovery exercise should be completed at the earliest opportunity and a repeat exercise of the updated disaster recovery plan should be conducted after hardware migration to ensure the disaster recovery preparedness of Umoja;**

(h) **Work related to the enrichment of the semantic layers of various modules should be prioritized in tandem with UE2 developments and accomplished expeditiously;**

(i) **Change requests pending for more than one year should be reviewed by the Change Control Board within a reasonable time frame;**

(j) **The Umoja transition plan for mainstreaming should continue to factor in the potential impact of the Secretary-General's reforms, the timelines of UE2 deployments and the requirements for continuous improvements in various modules.**

Follow-up of previous recommendations

27. Of the 22 recommendations pending up to the year ending 31 December 2016, 12 (54 per cent) have been fully implemented, 7 (32 per cent) are under implementation and 3 (14 per cent) have been overtaken by events. A more detailed commentary on the recommendations, together with details of the action taken by the Administration, is provided in annex I.

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[a] Internal Secretariat document entitled "Access control for the United Nations Secretariat: ICT technical procedure" (SEC.02.PROC).

[b] A semantic layer is a business representation of corporate data that helps end-users to access data autonomously using common business terms: it maps complex data into familiar business terms, such as product, customer or revenue, in order to offer a unified, consolidated view of data across the organization.

I. Background

A. Introduction

1. Umoja is the enterprise resource planning system of the United Nations that is aimed at modernizing a wide range of business processes spanning the United Nations administrative and support functions and systems that are essential to the efficient and effective functioning of the Organization. Enterprise resource planning is an integrated computer-based system used to manage internal and external resources, including tangible assets and financial and human resources. It is a software architecture whose purpose is to facilitate the flow of information between all business functions inside the boundaries of the Organization and manage the connections to outside stakeholders. Built on a centralized database, enterprise resource planning systems consolidate all business operations into a uniform and enterprise-wide system environment. Umoja represents a significant investment by the United Nations. As a single global solution for the Secretariat, Umoja was designed to offer real-time visibility of detailed data on all the administrative operations that it supports, irrespective of where they are being conducted in the world.

2. In its resolution 72/262, the General Assembly decided that the total Umoja project expenditure by 31 December 2018 should not exceed $516.7 million. The General Assembly also approved the resource requirements of the project until 31 December 2019 in the amount of $62.06 million, increasing the total budget through 2019 to $528.22 million. The Board noted that expenditure until 31 December 2017 had been $439.4 million.

B. Previous comments by the Board

3. In its resolution 66/246, the General Assembly requested the Advisory Committee on Administrative and Budgetary Questions to request the Board of Auditors to conduct a comprehensive audit of the implementation of the Umoja project and to report annually to the Assembly starting at the main part of its sixty-seventh session. In that connection, the Board has submitted six progress reports to date, as summarized below.

4. In its first report (A/67/164), the Board noted that it could not provide any assurance that the project would be delivered on time, within cost and to specification. It also noted that many of the problems encountered were avoidable and pointed to weak project governance and management, as well as to wider and deeper weaknesses in United Nations governance and management of business transformation.

5. In its second report (A/68/151), the Board noted that the project was on a sounder footing. However, owing to the challenges identified and the continuing legacy of past project problems and decisions, which would take some time to resolve, the Board stated that it was not yet in a position to provide assurance that the enterprise resource planning project would deliver its full functionality within the existing forecasts of time or cost or deliver the envisaged qualitative and quantitative benefits that would represent an optimal return on investment.

6. In its third report (A/69/158), the Board noted that the initial roll-out of Umoja Foundation had provided evidence of the need to introduce change more effectively in the future. The Board also noted that resolving those issues would require concerted effort throughout the Organization and hence, the Organization needed to develop an achievable, fully funded and independently assured deployment plan that reflected the diversity and complexity of the United Nations.

7. In its fourth report (A/70/158), the Board noted that, in order to achieve the aggressive implementation timetable for clusters 3 and 4, some key project activities, such as testing routines and data conversion exercises, had been curtailed. The Board also noted that weaknesses in preparing staff for the changes that Umoja would introduce and gaps in post-implementation support arrangements posed further risks to the implementation strategy, and that the Administration had not developed adequate contingency plans to mitigate those known risks. The Board further noted that significant challenges had been encountered with previous deployments of Umoja owing to a lack of organizational readiness, and there was a high risk that similar problems would emerge in 2015.

8. In its fifth report (A/71/180), the Board, while acknowledging that it was common for problems to be experienced in the implementation of major enterprise resource planning systems, determined that the decision to prioritize adherence to the deployment schedule above the need to ensure organizational readiness had increased the scale of the problems encountered. The Board stressed the need to demonstrate the ability to control the growing costs of the project and realize the financial and service delivery benefits that had been promised in order to present a viable business case that provided justification for further investment by the Member States.

9. In its sixth report (A/72/157), the Board stressed that there was a need to assess the total cost of ownership of Umoja, including both direct and indirect costs, and in so doing to take steps to account for the training costs in terms of staff time and travel. The Board noted the need to refine the benefit realization calculation by reviewing the original business case for its continuing validity and applicability. The Board also noted that the implementation of Umoja Integration globally across more than 40,000 staff in 400 locations was a significant achievement given the project's complexity and difficult start.

10. The present report covers matters relating to project governance, estimates of benefit realization and the total cost of ownership, progress in the deployment of the solution and the mainstreaming of the application. The report also covers user problem resolution and change request management. In addition, it contains the results of the IT audit of the Umoja application, covering user access provisioning, controls for segregation of duties, IT application controls and data quality. It has been prepared on the basis of audit examinations conducted from 29 January to 16 March 2018. The present report contains findings that, in the opinion of the Board, should be brought to the attention of the General Assembly.

II. Governance and management

A. Project governance

11. In the ninth progress report of the Secretary-General on the enterprise resource planning project (A/72/397), it was stated that Umoja continues to benefit from the strengthened governance model, with the Secretary-General remaining as a proactive champion of the project. It was also stated that the Management Committee, chaired by the Chef de Cabinet, reviews the project status periodically and provides guidance on strategic issues. It was further stated that the Umoja Steering Committee, chaired by the Under-Secretary-General for Management, meets monthly to oversee the strategic and operational management of the project.

12. The Board noted that, in 2017, the Management Committee met twice, in June and December, while the Umoja Steering Committee met regularly from January to April but met only twice thereafter, in August and October 2017.

13. The Board noted that UE2 deployments are taking place in the wake of the management reform proposals of the Secretary-General which, in the view of the Administration, compounds the risks to timely deployment since the reform proposals are having an impact on UE2 projects by requiring additional work on the part of the Umoja team and, more importantly, by reducing the capacity of business processes to support UE2 deployment owing to the competing demands for skilled resources. Similarly, there are multiple planned parallel deployments affecting the same business process owners. To deliver the project on time in such an environment, as mentioned in the above-mentioned report, heads of business units need to be actively engaged and senior managers should be open to re-engineering their current processes and practices for the greater good of the Organization. The role of governance bodies such as the Management Committee and Steering Committee will continue to be paramount in that challenging environment.

14. The Administration stated that the Secretary-General, the Chef-de-Cabinet (Chair of the Management Committee) and the Project Owner (Chair of the Steering Committee) have been very strong advocates of Umoja, extending all the support needed. In addition, the heads of business units are required, in their compacts with the Secretary-General, to support Umoja as needed and all stakeholders have generally provided such support.

15. The Board also noted that project management has made efforts to obtain business readiness assurance from business process owners and has focused on SAP technical training covering various streams, which will be crucial for the transfer of knowledge from consultants to project staff.

16. While appreciating that the development of Umoja is led from the top, the Board is of the view that the Management Committee and Steering Committee should continue to take the lead in guiding Umoja implementation.

B. Managing benefits realization

Background

17. In its resolution 71/272, the General Assembly noted that the Umoja project represented one of the largest and highest-cost business transformation initiatives undertaken by the Organization. The Assembly requested the Secretary-General to submit at the main part of its seventy-second session an updated business case for the Umoja project, including an analysis of the direct and indirect costs and benefits, taking into account all the relevant recommendations of the Board of Auditors and ACABQ.

18. The Assembly also noted that insufficient progress had been made in the development of a benefit realization plan and requested the Secretary-General to accelerate the development of such a plan, taking fully into account all the relevant recommendations of the Board of Auditors, and to report thereon in the next progress report. The Assembly also requested the Secretary-General, in developing realistic benefit realization plans for implementing entities, to use a common methodology and provide details on both qualitative and quantitative benefits, and to report thereon to the General Assembly at the main part of its seventy-second session.

19. In its related report (A/72/7/Add.31), ACABQ stated that there was a need to establish a clear and transparent record of the realization of qualitative and quantitative Umoja benefits, including the impact of Umoja on the staffing and resource requirements of individual offices and departments. ACABQ considered that the continued lack of progress made in the development of benefit realization plans had resulted in a lack of clarity regarding the Umoja benefits presented in the budgetary proposals, as well as among the implementing entities responsible for the

realization of Umoja benefits. ACABQ indicated its intention to request the Board of Auditors to undertake a detailed verification exercise with a view to validating the statement of quantifiable Umoja-related benefits.

20. In its resolution 72/262, the General Assembly noted the insufficient progress made in the development of a benefit realization plan and stressed the need to establish a clear and transparent record of the realization of the qualitative and quantitative Umoja benefits. The Assembly regretted the inability of the Secretariat to provide sufficient information quantifying Umoja-related efficiencies and benefits and requested ACABQ to request the Board to undertake a detailed verification exercise with a view to validating a statement of quantifiable Umoja-related benefits, and to report thereon in its seventh annual progress report.

Qualitative benefits

21. In the ninth progress report of the Secretary-General (A/72/397), qualitative improvement areas were identified by functional pillar. The Board notes that end-to-end process management is a significant change triggered by Umoja.

22. The Board appreciates that with the stabilization of UE1 and the deployment of UE2, there are likely to be greater opportunities for realizing qualitative benefits in future.

Progress made by the Secretariat in estimating quantitative benefits

23. In his first annual progress report (A/64/380), the Secretary-General presented a range estimate of the quantitative benefits that Umoja could potentially deliver under five components — human resources, finance, central support services, supply chain/procurement/logistics and technology and data management — as a result of refining business processes, improving the quality and availability of information, reducing manual effort and building staff skills. The Secretary-General outlined the top-down methodology that had been used to estimate the benefits that could be realized, identifying several key success factors that had to be met and maintained; those estimates had been based on assumptions to be validated over time and using incomplete baseline data owing to the limitations of existing information systems and the significant differences in the "as is" operating models across Secretariat entities.

24. Although there was little progress in that regard during the intervening period, all the process owners (heads of the Department for General Assembly and Conference Management, the Office of Central Support Services, the Office of Human Resources Management, the Office of Programme Planning, Budget and Accounts, the Department of Field Support/Logistics Support Division) were requested by the Controller in July 2016 to provide inputs on a three-pronged strategy on (a) qualitative benefits, (b) a longer-term return on investment calculation as well as (c) quantitative benefits, which were to be based on the main processes affected by Umoja in each of the main process areas. That represented a first step in adopting the bottom-up approach to realizing benefits.

25. In the eighth progress report of the Secretary-General (A/71/390), on the basis of experience gained after the deployment of Umoja Foundation and UE1 and as recommended by the Board of Auditors in its previous reports (A/70/158 and A/71/180), the benefits targets were revised on the basis of a bottom-up approach adopted by process owners in their respective areas. The quantification was based on different criteria, as appropriate, for each process area, and the targets were distributed among the business entities.

26. The updated benefits were included in the ninth progress report of the Secretary-General (A/72/397) and are reproduced in table 1.

Table 1
Umoja quantitative benefits

(Millions of United States dollars)

Regular budget	*Amount*	*Peacekeeping*	*Amount*
2014–2015	2.3	2013–2016[a]	21.9
2016–2017	47.7	2016/17	18.5
		2017/18	4.7[b]
2018–2019	27.8[c]	2018/19	33.0
		2019/20	9.6
2020–2021	7.2	2020/21	26.4
Total	**85.0**	**Total**	**114.1**
Annualized benefit	42.5		114.1
Maximum annualized, recurring benefits to be realized by 2021			**156.6**
Cumulative benefits to be realized by 2021[d]			**671.2**

Source: A/72/397, table 3.

[a] Includes the 2013/14, 2014/15 and 2015/16 periods and reflects efficiency gains for peacekeeping missions of $20.2 million enabled by Umoja as a platform to streamline processes.

[b] A total of $4.7 million in benefits was identified at the time of issuance of the proposed budget for 2017/18 of the individual peacekeeping components. An updated figure will be provided in the tenth progress report.

[c] On the basis of the budget formulation process, in which departments and offices translated the estimated efficiencies to budgetary impact, a total of $64.3 million in reductions was identified in the proposed programme budget for the biennium 2018–2019, including other efficiencies that, while enabled by Umoja, are not entirely attributable to Umoja.

[d] Recurring benefits from 2013 have been aggregated biennially, for the regular budget, and annually, for peacekeeping, to compute cumulative benefits.

27. The Board held consultations with process owners to understand the overall basis for the calculation of quantifiable benefits as included in the ninth progress report (A/72/397). It was informed that the quantitative benefits for the regular budgets of different bienniums and the peacekeeping budgets of different years, as contained in the ninth progress report, had been divided into five pillars: human resources, finance, central support services (travel and procurement), supply chain management and information technology and data management.

28. The benefit realization figures (to be realized for future periods) for the regular budget and for the peacekeeping budgets, by pillar, are set out in tables 2 and 3.

Table 2
Benefit realization figures in respect of regular budget, by pillar

(Millions of United States dollars)

Fiscal period	*Central support services*	*Finance*	*Human resources*	*Supply chain management*	*ICT*	*Others/ miscellaneous*	*Total*
2014–2015	–	2.3	–	–	–	–	**2.3**
2016–2017	11.9	2.5	3.5	–	6.1	23.7[a]	**47.7**
2018–2019	8.0	2.4	8.7	1.5	7.2	–	**27.8**
2020–2021	–	1.3	–	5.9	–	–	**7.2**
Regular budget subtotal	**19.9**	**8.5**	**12.2**	**7.4**	**13.3**	**23.7**	**85.0**
Annualized benefit of $42.5 million till 2021							

Source: Data provided by process owners.
[a] Top-down figure based on budget consultations.

Table 3
Benefit realization figures in respect of peacekeeping budget, by pillar

(Millions of United States dollars)

Financial year	*Central support services*	*Finance*	*Human resources*	*Supply chain management*	*ICT*	*Total*
2013/14	0.2	1.5	–	–	–	**1.7**
2014/15	0.3	3.5	4.2	0.2	–	**8.2**
2015/16	0.1	5.8	5.5	–	0.5	**11.9**
2016/17	0.1	0.7	16.4	0.7	0.6	**18.5**
2017/18	0.2	2.1	1.3	0.7	0.4	**4.7**
2018/19	22.3	0.8	0.7	–	9.2	**33.0**
2019/20	–	0.8	–	8.8	–	**9.6**
2020/21	–	–	–	26.4	–	**26.4**
Peacekeeping budget subtotal	**23.2**	**15.2**	**28.1**	**36.8**	**10.7**	**114.0**[a]

Source: Data provided by process owners.
[a] Slight variation from figure of $114.1 million given in ninth progress report owing to rounding.

29. In order to validate the statement of quantifiable Umoja-related benefits with figures by pillar, the Board requested information and documentation from all the designated Umoja process owners (heads of OCSS, the Office of Information and Communications Technology, the Office of Human Resources Management, the Office of Programme Planning, Budget and Accounts, the Department for General Assembly and Conference Management and the Department of Field Support/ Logistics Support Division), who were accountable for the statement of benefit realization associated with their processes.

Identification of business processes for benefit realization

30. The Board noted that the process owners for finance, human resources, ICT and central support services had identified processes that contributed to quantitative benefits owing to Umoja. Those processes had contributed in terms of both post- and non-post cost reductions. Efficiencies which had accrued as non-post benefits, such

as efficient processing of staff claims, were computed in terms of full-time equivalents and monetized on the basis of standard cost of resources. The Board noted that coordination work and consultations were undertaken by the Office of Programme Planning, Budget and Accounts with other Umoja process owners and the final benefit figures were arrived at on the basis of feedback received from process owners. The Board appreciates the efforts made by process owners to identify the business processes and build up a basis for the quantum of benefits realized from year to year.

31. The estimates of the quantum of benefits realized on account of post-reduction-related benefits were assessed in audit and were found to be in order. However, in the case of non-post benefits, the Board found that it was difficult to infer the validity of the estimated quantitative figures in the following two instances:

(a) In the supply chain stream, the benefit figures were supposed to be realized by better planning and management of inventory and demand/supply planning capabilities, which would be enhanced with the deployment of UE2 supply chain management, phase 2. The Board was informed that as the solution landscape of UE2 supply chain management, phase 2, had not been finalized when benefit figures were being computed in 2017, it was decided by the Department of Field Support to assume the total benefit as $44.2 million, i.e., at the upper range of the benefits range produced for the Umoja business case in 2010, a top-down-driven figure without further documentation or basis;

(b) For the peacekeeping budget for the period 2018/19, an amount of $33 million for quantitative benefits was reported in the ninth progress report of the Secretary-General (A/72/397). However, the aggregate benefit figure under all pillars for the peacekeeping budget of 2018/19 amounted to only $23.56 million and not $33 million. The Administration informed the Board that the additional amount of $9.2 million was on account of benefits resulting from the IT stream, based on the assumption that benefits related to the decommissioning of applications would be realized mostly in 2018/19. However, the Board could not find a documented basis for this figure of $9.2 million under the IT stream for the peacekeeping budget of 2018/19.

32. The Board was informed that most missions had not identified Umoja benefits when the peacekeeping budget proposals were being processed for the financial year 2018/19 (as at March 2018). Hence, the Board is concerned that there is little assurance regarding the quantum of benefits for peacekeeping missions being realized from Umoja in 2018/19.

Documentation aspect of benefit realization figures

33. In order to validate the stated amount of benefit realization, the Board checked various figures for different fiscal periods and correlated those figures with the spreadsheet file maintained by the Secretariat for detailed calculations. The Board noted that there was much scope for improvement in maintaining documentation and preserving institutional memory for the overall process of benefit realization. Many assumptions for different processes were embedded in the spreadsheet without adequate supporting documentation being provided, which created challenges for the verification of quantitative figures. The Board is of the view that it is important to clearly document the assumptions underlying computation of benefit realization because they might need to be revisited in future to ensure continued validity or otherwise at the time of updating the figures for quantitative benefits when more processes would qualify for benefit realization after implementation of UE2. Since those figures were reported to Member States and would likely form the basis for

budget impact targets, the lack of adequate documentation and institutional memory of the calculation process need to be addressed on a priority basis.

Earmarked resources to manage the process of benefit realization

34. The Board also noted that there was no continuity in earmarking resources for monitoring the benefit realization process. The coordination work related to the aggregation of quantitative benefits, as reported by Umoja process owners under a bottom-up approach, was completed by the Office of Programme Planning, Budget and Accounts in the 2016–2017 biennium. However, there was little clarity about the organizational unit that should monitor the benefit realization of Umoja in future. The Board was informed by the Office that the coordination work done for the aggregation of quantitative figures as provided in the ninth progress report of the Secretary-General was a one-time exercise: the Office of Programme Planning, Budget and Accounts was not the primary process owner for benefit realization but one of the process owners in respect of the finance pillar. Therefore, the Board noted that it was important to identify a primary process owner and clearly delineate the responsibilities and accountabilities in respect of the process of benefit realization between the primary process owner and the Umoja process owners of various functional pillars.

Benefit realization plan

35. According to a Gartner research note,[1] getting value from enterprise resource planning investments has challenged many organizations. Enterprise resource planning strategies offer the opportunity to deliver improved business outcomes and benefits, provided that enterprise resource planning leaders work with business stakeholders and maintain focus on benefit realization throughout the enterprise resource planning life cycle. Many organizations fail to identify and then track the business outcomes and harvest the benefits from their enterprise resource planning investment. Disciplined value measurement is frequently absent, started too late and not sustained".

36. As soon as benefits have been identified, organized and structured, the next step is to design the benefit realization plan, which should include the management actions required to maintain and execute such a plan. The benefit realization plan usually serves as a summary of the main milestones for which each benefit has a detailed description (a benefit profile). It helps to ensure that all anticipated benefits are effectively established and actively managed. Being a management tool to monitor, control and manage current benefits, the benefit realization plan entails such key activities as measurement, evaluation, processing, reporting and implementation in order to draw all benefits together and form a collective set of benefits. This serves as a centralized source of information to help track what needs to be done and to manage the successful achievement of benefits. The benefit owner uses this information to conduct analysis and make proper evaluation of the realized benefits against the original project goals and requirements.

37. The Board observed that although there was an indicative schedule of benefit realization, there was no documented benefit realization plan in place that would help the Secretariat in establishing a clear and transparent record of the realization of the qualitative and quantitative Umoja benefits. This matter was also stressed by the General Assembly in its resolution 72/262.

[1] Carol Hardcastle and Denise Ganly, "ERP benefits realization: chasing the pot of gold", Gartner research note G00278365 (2015).

38. **The Board recommends that:**

(a) The Administration should develop an Umoja benefit realization plan, with an emphasis on improvements resulting from Umoja-based business processes and monitoring of the processes to leverage further benefit realization;

(b) The Administration should maintain adequate documentation supporting the computation of quantitative figures for benefit realization;

(c) The Administration should identify a coordinating division/unit as a primary process owner of benefit realization responsible for (i) monitoring the process of benefit realization, (ii) engaging stakeholders of the various units and divisions, and (iii) continuous monitoring.

C. Total cost of ownership

39. The total cost of ownership is a comprehensive assessment of information technology (IT) or other costs across enterprise boundaries over time. For IT, the total cost of ownership includes hardware and software acquisition, management and support, communications, end-user expenses and the opportunity cost of downtime, training and other productivity losses. The need to assess the total cost of ownership is that the purchase price is not a good indicator of long-term costs. This is most relevant for an enterprise resource planning implementation, where subsequent costs like software licence cost, implementation costs, training costs, support costs and maintenance costs would be substantial. Total cost of ownership attempts to combine all of the different categories of costs into one number and use that number for making decisions.

40. As mentioned in the ninth progress report of the Secretary-General (A/72/397), the total cost of ownership analysis is not a complete cost-benefit analysis. It sees only the cost side of an enterprise resource planning. Hence it forms a part of the larger business case analysis.

41. In its sixth report (A/72/157), the Board stated that the Umoja project team has not yet assessed the total cost of ownership. The Board noted that while the direct costs could be easily quantified, the quantification of the indirect costs had been challenging as time sheets had not been maintained for staff of the Secretariat, making it especially challenging to track the time of staff engaged only on a part-time basis in such activities. The Board noted that the Umoja team has been attempting to estimate such cost retroactively, on the basis of reasonable assumptions.

42. The ninth progress report of the Secretary-General included the total cost of ownership of Umoja assuming a useful life of 15 years (till 2030), as set out in table 4.

Table 4
Total cost of ownership of enterprise resource planning
(United States dollars)

Cost category	*Period*	*Amount*
Direct costs (Umoja)	2008–2019	543 741 600
Indirect costs	2013–2017	100 471 729
	2018–2019	32 000 000
Training costs (time of users)	2013–2017	64 331 944
	2018–2019	15 000 000
Maintenance cost for 15 years	2016–2019	118 600 000
	2020–2030	528 000 000
Total	**2008–2030**	**1 402 145 273**

Source: A/72/397, table 6.

43. The Board noted that the Administration's estimate of the total cost of ownership is reasonable although there was scope for refinement as indicated below.

Direct costs

44. The ninth progress report of the Secretary-General (A/72/397) estimated a direct cost of $543,741,600 over the project implementation, which the Board noted had been calculated on the basis that project implementation in all respects (full functionality and post-implementation activities, including stabilization) would be completed by December 2019. The Administration informed the Board that there are plans to mainstream Umoja after full implementation, wherein the technical roles will be transferred to the Office of Information and Communications Technology and non-technical roles to business process owners. The mainstreamed Umoja office will take care of activities such as continuous improvements going forward. As to whether the cost of the mainstreamed Umoja office was included in the total cost of ownership calculation, the Administration informed the Board that that cost had been included in the annual maintenance figures of $48 million from 2020 onwards. The Administration informed the Board that the estimated maintenance cost in 2019 came to about $32 million, while the balance of about $16 million was estimated to be the approximate annual cost of the mainstreamed Umoja office post-2019. The Administration also informed the Board that the future direct cost estimate of $16 million was a reasonable estimate as the current trend of downsizing would ensure that the staff and contractor/consultant costs would be contained within that amount. As to continuous improvements, it was expected that they would have to be managed within that resource base, especially as the team's capacity would be higher when they would not be deploying new functionalities.

Indirect costs

45. Indirect costs relate to costs incurred by departments to facilitate operational readiness, including activities such as cleansing and enrichment of data, user testing and deployment coordination. In the ninth progress report of the Secretary-General (A/72/397), the Administration had estimated the indirect cost at $100,471,729 for the period 2013–2017, including the cost of personnel associated with Umoja deployments but not of those working directly in the Umoja office.

46. The Board appreciates the efforts made by the Administration to identify the personnel involved in an event after the event has happened. The indirect cost estimation had been based on the standard costs applied to staff according to their roles in the deployment, whereby each role was assigned an indicative grade/level and representative full-time equivalent person-months for the estimated amount of time spent in the deployment. The Board was also provided with the list of personnel involved with the Umoja deployment and the indirect cost figure till 2017.

47. The Board reviewed the calculations and was of the view that the indirect cost figure till 2017 mentioned in the ninth progress report generally corresponded with the cost estimates of those resources used in deployments.

48. The Board is of the view that there is a likelihood of continuous improvements taking place post-2019 that may involve further indirect costs. The Administration informed the Board that it has not included such indirect costs in the report in view of the difficulty of accurately estimating it.

Training cost

49. The Board noted that the Administration has automated the training cost measurement based on the available training details. The Board also noted that the training costs are based on certain assumptions due to non-availability of reliable

training data for the prior periods, and accordingly the training cost estimation was aligned with the assumptions made for the likely scenario. In particular:

(a) The model captured training cost of only those trainees where the enrolment status in the Inspira data was filled as completed. There was a possibility that some participants may have attended the course without entering their status as "completed". The Administration stated in reply that including all the cases in estimation would have the impact of hugely inflating the figures and would be more prone to errors;

(b) The model captured the training cost only once, even if a participant had attended the same training course multiple times. Although Inspira data showed instances of participants attending the same course multiple times, it was the Administration's view that multiple records in the database are more likely an indication of data errors than of participants actually attending the courses more than once;

(c) The Board also noted that training costs have not taken into account the cost of facilities, the travel costs of participants and instructors and the staff costs for instructors. The Administration responded that the costs related to those items would not be material and would not be commensurate with the efforts required to capture such costs;

(d) The Board further noted that training costs from 2020 onwards have not been included in the total cost of ownership calculation.

50. The Administration responded that an analytic model and the credibility of assessments is dependent on the quality and accuracy of data used. It informed the Board that the root cause of possible inaccuracies in the training cost estimation model was the quality of Inspira data, which needed to be addressed to ensure a better estimate of training costs.

Maintenance costs

51. The ninth progress report of the Secretary-General (A/72/397) indicated that the maintenance costs of Umoja would be $118,600,000 for the period from 2016 to 2019. The annual maintenance costs of Umoja were estimated to be $48 million from 2020 onwards, including $32 million for maintenance activities with the remaining $16 million to cover post-implementation mainstreaming by the Umoja project office. The figure of $48 million is based on the annual maintenance costs as projected in the report of the Secretary-General on the status of implementation of the information and communications technology strategy for the United Nations. However, the Board is of the view that that estimate may change given the likely need to acquire new software licences in view of increasing usage going forward. The Administration informed the Board that it does not have a basis for estimating such costs at this stage and agreed to conduct a general review to ensure that there are enough licences for all new functionalities.

III. Application controls and data quality issues

A. Application controls

52. Application controls are controls over the input, processing and output functions in an IT system. Application controls are further categorized as (a) input controls, (b) processing controls and (c) output controls. Input application controls are those used mainly to check the integrity of data entered into a business application, whether the data is entered directly by staff, remotely by a business partner or through a web-

enabled application or interface. Processing application controls provide an automated means to ensure that processing is complete, accurate and authorized. Output controls compare output results with the intended result by checking the output against the input.

53. The Board assessed a few application controls, selected on the basis of risk and problem areas identified in various service requests made by Umoja users, which are built into the implemented modules of Umoja.

Uncertified sick leave

54. According to rule 6.2(c) of Staff Regulations and Rules of United Nations, a staff member may take uncertified sick leave for up to seven working days in an annual cycle starting 1 April of any year or such other day as the Secretary-General may set for a duty station, when incapacitated for the performance of his or her duties by illness or injury.

55. The Board analysed the Umoja human resources reports for the period from 1 April 2017 to 5 March 2018 for uncertified sick leaves. Based on an analysis of the Umoja data, the Board observed that 168 staff members took uncertified sick leave in excess of the normal seven days limit in the period from 1 April 2017 to 5 March 2018.

56. The Administration stated that a defect was detected in December 2017 regarding leave calculations related to uncertified sick leave not being properly deducted from quotas. The defect was resolved and a corrective action put into production on 30 January 2018, after which the issue was corrected and the limit of seven days duly enforced. It was also stated that there is an outstanding clean-up action required to address the cases highlighted in audit which, as a result of the defect, allowed deduction beyond the seven days limit. Further, the Board was informed that the Office of Human Resources Management is working with Umoja to prepare a clean-up plan for those cases. The Board is of the view that it may not be possible to certify the leave balances from Umoja till the completion of the clean-up exercise. The Administration indicated that the annual time certification would be triggered on 1 July 2018, by which date it is expected that the clean-up actions will be completed.

57. **The Board recommends that the Administration complete the clean-up exercise in time for the annual time certification exercise.**

58. **The Board also recommends that the Administration monitor the accuracy of the corrective action put into production to ensure that Umoja system does not allow the limit of uncertified sick leave days that a staff member may take in a year to be exceeded.**

Negative balances in different leave quotas

59. The Board analysed the most recent Umoja reports on absence quotas for staff members located in New York, noting 147 cases of negative balances, as of 5 March 2018, in leave quota types that should not have had negative balances. The negative balance cases, based on type of leave, are summarized in table 5.

Table 5
Cases with negative leave balances

Type of leave	*No. of cases with negative leave quota balance*
Compensatory time off	46
Compressed regular days off	1
Paternity leave	1
Sick leave with full pay	7
Uncertified sick leave	92
Total	**147**

Source: Audit analysis of Umoja data.

60. The Administration responded that:

(a) Further research was required to determine the cause of the negative absence quotas in cases of compensatory time off;

(b) In the sole case of compressed regular days off, it was stated that this was happening because of the presence of two different quotas for similar kinds of leave, which should be merged in Umoja;

(c) In the case of the paternity leave quota, it was stated that the reported case required further research;

(d) In the cases of sick leave with full pay, it was stated that there were multiple leave quota records that existed, which should not have been the case. As a result, negative balances appeared in the report because of linkages with incorrect leave quotas. The Office of Human Resources Management would research the cause of these and take action to correct and, where possible, would prevent overlapping quotas in the future;

(e) For negative balances in uncertified sick leave quotas, it was stated that the possibility to have negative quotas had been addressed by change management in Umoja in January 2018;

(f) The Board was also informed that the Office of Human Resources Management is reinforcing within the human resources community the need for routine monitoring of several different elements related to leave, including monitoring of leave quota balances.

61. **The Board recommends that the Administration analyse the negative balances identified by the Board for each type of leave quota and rectify the Umoja human capital management module through change request(s), as applicable.**

Pending parked documents in Umoja

62. SAP is based on the "document principle", meaning that a document is created out of every business transaction in the system. The document is the result of a posting in accounting in SAP and is the connecting link between various business operations.

63. Parked documents may represent (a) transactions for which there is incomplete information available to complete the transaction or (b) transactions that should be deleted as part of a housekeeping process. As per the job aid on how to review parked documents, an early activity in the Umoja closing process is to confirm that the review of the parked documents is complete, with the objective of ensuring that no parked

documents are outstanding prior to the closure of the financial period. In that regard, the Board noted that 1,185 documents pertaining to the prior financial periods were pending as of 5 March 2018. The Board also noted that firefighter IDs[2] were used at times in the past to deal with situations arising from parked documents.

64. In response, the Administration stated that the responsibility for the management of parked documents rests with accounting offices and parked documents are controlled within the system by the fact that they cannot be finalized or posted to finance ledgers without being approved by a functional approver. The Board was also informed that the Assurance and Monitoring Unit of the Accounts Division of the Office of Programme Planning, Budget and Accounts kept track of all pending parked documents through their published dashboards. Parked documents were being routinely deleted by the Accounts Division as a part of the monthly closing of accounts with the following exceptions: (a) logistic invoices (i.e. MIR7 invoices against purchase orders); (b) field support suite travel documents (created through an interface process); and (c) United Nations Development Programme documents (created through an interface process).

65. While the Board appreciates that parked documents are a regular part of any enterprise resource planning system, it is advisable to constantly review the pending parked items to ensure that transactions that needed to be executed have not remained parked.

66. **The Board recommends that the Administration review the parked documents of closed budget periods and ensure deletion as part of a data clean-up exercise.**

B. Data quality issues

67. Data is said to be of high quality if it is "fit for use" in its intended operational, decision-making and other roles. Good quality of data is a prerequisite for realizing organizational value through business intelligence and data analytics. The usefulness of an enterprise resource planning project in improved decision-making and forecasting is dependent on the quality of data it houses. In view of the above, the Board test-checked the master data tables related to material and inventory and its observations in that regard are as follows:

(a) The Board was informed that all equipment records created were mapped to a United Nations Standard Products and Services Code (UNSPSC), which is used to classify the material group. The Board noted that in the Umoja table EQUI, which contains the details of all equipment, of 927,970 equipment items 30,500 items did not have a UNSPSC, of which 396 items did not have a material number either, which precluded the possibility of mapping the equipment to the material group using the material number. The Board is of the view that the categorization of equipment into material types and groups is important for inventory planning;

(b) In addition, the Board observed that the number of equipment items in the Umoja table EQUI was about 25,000 greater than the number of equipment items in another Umoja table, EQUZ, which records the time and location information of the equipment. The Administration acknowledged that that was an error and that a change request has been created to rectify it. The Administration also informed the Board that

[2] In the SAP/enterprise resource planning environment, a firefighter ID is a user account with special privileges that can be temporarily assigned to a designated person for carrying out emergency operations in the production environment.

it is working to remove already existing redundant records pending the change management being implemented;

(c) MARA is an SAP table that stores master data about various types of materials being used in the Organization. When a new material master record is created, a review is performed of existing materials to ensure that the new material differs in form, fit and function from existing material master records in order to avoid duplicate material master records of similar type, leading to problems in the mapping of new equipment and the need to correct material master records. The Board noted that there were about 156,000 items in the material master records and 12 instances of master data items with a different material master number but with the same description. The Board is of the view that the rationalization of the material master records to eliminate similar items is required and that there is a need to strengthen controls to ensure that new materials being created in the material master record are different from existing materials;

(d) While analysing the asset master data, the Board observed 203 instances relating to 5,032 assets with the same description but categorized under a different asset class. For instance, Generator Set, 250 KVA, was found under both asset class 210 (office equipment) and asset class 530 (Heavy engineering and construction equipment). Such instances could also have an impact on financial reporting as different asset classes have different life cycles and different depreciation rates. The Administration informed the Board that such instances could have arisen on account of data conversion activities and in some cases through manually created assets. The Administration also informed the Board that material master records are created via an established process that entails multiple levels of checks and controls and stated that the Umoja material master was being reviewed, adjusted and enhanced to meet the requirements for UE2 and supply chain management, phase 2.

68. While acknowledging the response of the Administration, the view of the Board is that a review of the master data is needed to ensure the quality of the data so that decision-making is better supported.

69. **The Board recommends that the Administration ensure that all equipment records be mapped to material numbers and/or a UNSPSC code.**

70. **The Board also recommends that the Administration review the material master records and rationalize the entries therein.**

71. **The Board recommends that asset classes be reviewed to ensure that similar equipment is categorized under the same asset classes.**

IV. IT security

A. User access provisioning

72. The governance of user access for Umoja sites that have already been deployed includes the granting of access to new staff members, the changing of access by existing staff members and deactivating users upon separation. User access covers user access rights that require delegations of authority and those not linked to delegated authority. User access provisioning relates to the identification of a staff member's Umoja role(s), the definition of the workflows in the system and the granting of role(s) in Umoja.

73. User access controls are important because unauthorized access can result in distribution of sensitive data and information, loss of data integrity or disruption of the enterprise business, resulting in the exposure of the Organization to operational

and financial risks. Strong controls in this area seek to minimize risks by identifying each user uniquely and establishing uniform access controls, with appropriate reporting and actions to remediate unauthorized access.

74. Access to Umoja has been through a single sign-on process since 2015 and is largely governed by the internal Secretariat document entitled "Access control for the United Nations Secretariat: ICT technical Procedure", which was approved by Chief Information Technology Officer (CITO) in February 2014. That document outlines the access control policy and related procedures for the United Nations Secretariat and defines the minimum common requirements of access control for all ICT systems. The user IDs (Unite IDs) are provided by the Office of Information and Communications Technology and the same IDs are used to access the various applications in use in the Secretariat, including Umoja.

75. The Umoja user base has grown to more than 54,120 users as of 18 February 2018, all of whom access the system from about 400 global locations. The granting of access to Umoja is managed by a custom-built user access provisioning application. Every user has a business/enterprise role in the real workflow. The enterprise roles are mapped within Umoja by means of technical roles, which have privileges and restrictions attached to them. It is important that only authorized users are able to access the Umoja system and the level of access should be according to the "need to know" principle and according to their job functionalities.

76. The enterprise roles and authorizations required by each user are determined by the Umoja security liaison officers in the end user offices, who are in turn designated by the entity's functional approvers; they coordinate all Umoja security matters in the end user offices and interface between Umoja end users in their offices and the Umoja security team for user registration, roles and administration. When users no longer require access, the approver that requested the account should notify the relevant help desk or system owner to disable the user's account and/or authorizations.

77. The Board assessed whether the digital identities and access controls are managed well to minimize the risks of unauthorized access to Umoja's critical information assets.

Separated employees with active user IDs

78. The Board compared the list of Umoja users (as of 18 February 2018) with Office of Human Resources Management data of separated users (2016 and 2017) and enterprise identity management system (EIDMS) data (active Unite IDs as of 13 February 2018) received from the Office of Information and Communications Technology.

79. As of 18 February 2018, there were 2,996 unlocked user[3] accounts in Umoja for staff members who had separated in 2016 and 2017, all with valid end-dates of "31.12.9999" and with active Unite ID status as of 13 February 2018, meaning that it was possible for them to access Umoja using the single sign-on Unite identity. The Board observed that of those 2,996 former staff members with active user IDs, 1,105 had accessed Umoja after separation, 236 had accessed Umoja more than 90 days after separation and 19 had accessed Umoja more than one year after separation.

80. The Administration was of the view that separated employees need to access the employee self-service functionality of Umoja for a few months after separation in order to settle the final claims. However, the Board noted that there is no policy in

[3] The Umoja access management team may restrict or allow the access of a user to the Umoja application by locking or unlocking the account, respectively; unlocked users are those to whom access has been allowed by the Umoja team.

place for that. Further analysis showed that many of the separated employees had more than the employee self-service-related roles. There were 290 former employees with active user IDs who had been assigned roles other than employee self-service roles (1,344 different roles under the business intelligence, human resources, financial accounting, funds management, technical, receive to distribute, source to acquire, customer service and real estate modules), 139 of whom had accessed Umoja after separation.

81. The Administration informed the Board that user access provisioning in Umoja had ben delegated to the business community. Each process owner designated a role owner and the security liaison officer had been so designated by the functional approvers in each entity. The security liaison officers initiated/approved the access provisioning and deprovisioning in the Umoja production environment through the user access provisioning tool and the related EIDMS identity management platform. They were also required to initiate the deprovisioning of user access when the user was no longer authorized to perform the role. In addition, the Umoja team, in collaboration with process owner focal points, had conducted a review and informed the Board that, of the 139 cases identified, 6 former staff members had been contracted through United Nations Office for Project Services and the United Nations International Computing Centre by divisions in the Secretariat, 6 had been re-employed as individual contractors or consultants, 2 had become active staff members again and 8 had active non-staff relationships such as meeting participants or consultants. The response, however, was silent on the 2,996 unlocked users in Umoja as of 18 February 2018 who had separated in the years 2016 and 2017. While noting that the status of separation of a staff member is not the sole determinant of their user access rights, the Administration agreed that a full review of all the cases identified would have to be undertaken to establish whether their access had been inappropriately authorized.

82. The Board stresses the need for better coordination among the Office of Human Resources Management, the Office of Information and Communications Technology and the Umoja project office so that the continuing access of separated employees can be reviewed centrally at regular intervals. At the same time, there is a need to making the security liaison officers aware and accountable so that there is a better appreciation on their part about the need to initiate the deactivation of separating staff members. The Administration informed the Board that process owners are working to implement a procedure for deactivating Umoja access.

Periodic reviews of access management

83. Paragraph 8.1 of the internal Secretariat document entitled "Access control for the United Nations Secretariat: ICT technical procedure (SEC.02.PROC)" states that information owners shall review the access privileges of user accounts every 12 months to determine if access rights are still commensurate to the user's job duties, while user accounts with privileged access rights shall be reviewed every 6 months. Documentation for such reviews shall include information about who conducted the review and what action (if any) was taken by the application owner, and shall be maintained according to the published retention schedule.

84. On the issue of annual reviews of access by information owners/line managers to determine if the access of users is commensurate with their responsibilities, the Board was informed that annual reviews do not take place. It was added that the security liaison officers are required to initiate the deprovisioning of user access when the user no longer requires such access for their functions. A full-scale review of user access privileges every 12 months may be too resource-intensive relative to the risks involved. Since deprovisioning requests should be triggered by changes in functions or movement of staff to other duty stations/organizational units or

separation/retirement etc., it would be far more efficient to devise reports that collate such events for a review of user access by security liaison officers at periodic intervals. It was also stated that the Umoja team, in collaboration with the process owners, could enhance the user access provisioning tool and facilitate the production of additional reports that will facilitate the review of access management. The process owners could discuss the risk profile and determine the periodicity of the review.

85. **The Board recommends that the Administration ensure that properly documented reviews of user access provisioning are mandatorily carried out by security liaison officers with a frequency to be determined by Umoja process owners.**

86. **The Board also recommends that the Administration take measures to ensure that continuing access to Umoja by all separated and retired employees be terminated and that a policy be put in place to regulate continued access by separated employees to self-service requirements, as needed.**

Active firefighter IDs which were not in use

87. In the enterprise resource planning environment, a firefighter ID is a special privileged user account that can be temporarily assigned to a designated person to carry out emergency operations in the production environment. The procedures for temporary assignment and use of firefighter IDs by designated users are described in the internal Secretariat document "Guidelines for technical and functional support in Umoja production environment (version 6.3)".

88. The Board noted that there were 95 firefighter IDs in the Umoja system as of February 2018, of which 55 were being used and 40 were not in use although they were active accounts. The Administration stated that those 40 firefighter IDs would be deactivated.

89. The Board noted that since 2013, firefighter IDs had been assigned and used 732 times. In 700 cases, the assignment of firefighter IDs had been documented and a critical incident completion report of the assignment submitted by firefighter ID users, in compliance with paragraph 4.0 (k) of the above-mentioned guidelines, upon completion of the assignment. However, in 32 cases critical incident reports were not available.

90. **The Board recommends that the Administration immediately deactivate the firefighter IDs that are not in operation.**

91. **The Board also recommends that the documentation and submission of incident reports after usage of firefighter IDs be enforced.**

Staff members assigned more than one user account in Umoja

92. The Board observed that multiple user IDs have been assigned to the same employee in 241 instances, 50 user IDs of which, assigned to 25 staff members, remained active. Providing two user IDs to the same staff member carries the risk of only one account being deactivated at the time of separation and the user being able to gain unauthorized access to the system. In addition, one person with two IDs could lead to a bypass of the four-eyes principle.[4]

93. The Administration, while accepting that duplicate user accounts exist, stated that the configuration in Umoja ensures that only one EIDMS account can be

[4] The four-eyes principle is a controlling mechanism, used to facilitate the delegation of authority and increase transparency, which requires that an activity, i.e., a decision, transaction etc., be approved by two people.

associated with one person at any given time, making the other one irrelevant technically. The response of the Administration did not explain the existence of duplicate active accounts in the Umoja user list.

94. **The Board recommends that Administration ensure that only one unique user account is assigned to each staff member.**

95. **The Board also recommends that one of the two user accounts currently assigned to some staff members be immediately deactivated.**

Incorrect login attempts

96. According to the internal Secretariat document entitled "Access control for the United Nations Secretariat: ICT technical procedure (SEC.02.PROC)", user accounts on systems that grant access to classified information must be locked out after 10 invalid login attempts (a successful login attempt will reset that count) and will remain locked until the affected user requests the account to be unlocked.

97. The Board analysed Umoja User activity for incorrect login attempts and noticed that 1,073 users had made incorrect login attempts between 10 and 96 times. When this was pointed out, the Board was informed that Umoja users would not be in a position to continue logging into Umoja after 10 failed login attempts because the single sign-in Unite ID, which is also used for accessing Umoja, locks out the user after 10 failed login attempts. However, this was not being enforced for Umoja as the practice was to lock the account temporarily for a period of 15 minutes and users continued to make incorrect login attempts afterwards even after 10 unsuccessful attempts to log in.

98. In order to reduce the risk of unauthorized access, the number of failed login attempts should be limited in Umoja itself. The recommended setting for the concerned profile parameter is five, that is, one user is allowed to make five consecutive incorrect login attempts. However, this profile parameter in Umoja was set at 100 as of March 2018. If that value is reduced, the Umoja user account would automatically be locked after the specified number of failed login attempts until the user requests the account to be unlocked.

99. **The Board recommends that the Administration change the Umoja profile parameter for failed login attempts to a reasonably low number.**

Users who have not logged on for a long time

100. According to the internal Secretariat document entitled "Access control for the United Nations Secretariat: ICT technical procedure (SEC.02.PROC)", the access rights shall be removed in case a service is not accessed for more than three consecutive months. The Board observed that although, as of 18 February 2018, 469 users had not logged on to Umoja for more than 90 days, their IDs remained active in Umoja and Unite.

101. The Administration stated that it was conceivable that staff might not log in for more than 90 days owing to leave, other work pressures or no genuine need to log in during a specific period. It was added that the Umoja team and process owners would collectively try to determine if there are better criteria for deactivating users (such as contract status) rather than just duration of inactivity. It was also stated that the process owner representatives would collectively review the policy and make a recommendation to balance risk and effort in activating and deactivating access.

102. **The Board recommends that the Administration review the policy regarding inactive users and that Umoja user accounts should be locked after a prescribed period of inactivity.**

B. Segregation of duties

103. Segregation of duties is a basic internal control that prevents errors and irregularities by assigning the responsibility for initiating and recording transactions and custody of assets to separate individuals. Given the complex organizational structure of the United Nations, the implementation of segregation of duties is crucial to effective internal control.

104. The Umoja office developed a detailed enterprise role guide that sets out the combinations of roles that, if assigned to the same user, result in segregation of duties conflicts. The responsibility of provisioning of the roles is primarily that of the process owner. The security liaison officer workbook available on iSeek also provides guidance in identifying conflicting enterprise roles.

105. As a first step in implementing segregation of duties in Umoja, process owners identify incompatible duties listed in the enterprise role guide and security liaison officer workbook. On that basis, a segregation of duties matrix, detailing the risky combination of duties to be avoided, is developed. Keeping the security liaison officer matrix in context, roles are assigned to users. At times, section Chiefs and functional approvers are permitted to override segregation of duties rules and approve the provisioning of conflicting roles if they identify mitigating controls.

106. It was also noted that from July 2017 onwards, the user access provisioning application had been upgraded to identify segregation of duties conflicts at the request/approval stage if such conflicts are configured in the system. While the Office of Programme Planning, Budget and Accounts had already uploaded the segregation of duties matrix for their roles in the user access provisioning application, other roles owners were in the process of uploading the segregation of duties conflict matrix.

107. The Board noted that there were 1,146 users with 3,948 conflicting roles, which had already been identified by role owners and documented in the enterprise role guide and security liaison officer workbook. The Board is of the view that the lack of segregation of duties is risky and calls for mitigation.

108. The Administration replied that the segregation of duties conflicts detected by the Board would be analysed and resolved. It was also stated that there is a need to review the enterprise role guide.

109. **The Board recommends that:**

(a) **Umoja process owners should deprovision already assigned conflicting roles;**

(b) **The segregation of duties rules should be automated by the Umoja process owners in the user access provisioning application;**

(c) **A standard procedure be laid down for the periodic review of any documented conflicts overridden by appropriate business heads. The ability to override segregation of duties should be documented and controlled by means of periodic reviews.**

C. Business continuity and disaster recovery planning

110. Business continuity and disaster recovery planning is accomplished to ensure the timely recovery of information technology assets and services following a disruption. An ICT disaster recovery plan details the procedures designed to maintain or restore ICT operations, possibly at an alternate location, in the event of emergencies, system failures or disasters. The disaster recovery plan document

identifies the application recovery time objective and recovery point objectives, the disaster recovery strategy and the essential ICT assets and services that need to be recovered in case of a disaster; as well as instructions on how to execute the failover process and failover procedures.

111. As per United Nations Secretariat ICT procedure for disaster recovery planning, ICT service providers must test and/or exercise the ICT disaster recovery plan on a periodic basis (at least annually) to determine the plan's effectiveness and the Organization's readiness to execute the plan. Accordingly, a failover[5] and a failback[6] disaster recovery exercise of the Umoja application was performed on 6 May 2017 and 3 June 2017 respectively. The exercise aimed at validating the Umoja disaster recovery plan Umoja, performing a failover from data centre in Valencia, Spain to data centre in Brindisi, Italy, and a failback from Brindisi to Valencia data centre. The exercise was conducted, inter alia, to validate the failover/failback process and procedures for Umoja components and discover any gaps, as well as to verify the readiness of the Umoja disaster recovery infrastructure and train the team in preparation for a real disaster scenario. The exercise also aimed to check if the recovery time objective of 4 hours and the recovery point objective[7] of 10 minutes can be met. It was also noted that a maximum application downtime of eight hours was agreed by the business owners.

112. The Board observed that the actual recovery time that was achieved in the disaster recovery exercise was 18 hours and 35 minutes for the failover exercise and 7 hours and 15 minutes for the failback exercise. The Board also noted that the actual recovery point in both the failover and failback exercises was 0 minutes as it was a planned disaster recovery exercise during which the Umoja application was gracefully shut down and data synchronization was completed before starting the failover process. Thus, while the recovery point objective was met in both the failover and failback exercises, the recovery time objective was not met in either exercise. In addition, the maximum downtime was breached in respect of the failover exercise, while it was adhered to in the failback exercise. The details are set out in table 6.

Table 6
Disaster recovery exercise targets and achievements

Particulars	*Target*	*Actual*
Recovery time objective	4 hours	Failover exercise: 18 hours 35 minutes Failback exercise: 7 hours 15 minutes
Recovery point objective	10 minutes	0 minutes
Maximum application downtime	8 hours	Breached in respect of failover exercise

Source: Information provided by the Administration.

[5] Switching an application or ICT service system from its primary data centre to the secondary data centre.

[6] Switching an application or ICT service system from its secondary data centre to the primary data centre when no changes have been made in the system while it was running in the secondary data centre.

[7] The maximum targeted period in which data may be lost from an IT service owing to a major incident.

113. A report on the exercise[8] was prepared, detailing the activities that were performed to prepare and execute the failover and failback exercises, as well as the results of both exercises. The report also included the list of lessons learned during the disaster recovery exercise and the actionable items and recommendations for improvement that would be incorporated into the disaster recovery plan of Umoja.

114. Considering the fact that the recovery time objective could not be met in either the failover or the failback test and that the recovery time was much longer than the adopted standards, the Board is of the view that it is important to conduct an early repeat exercise of the updated disaster recovery plan.

115. The Administration informed the Board that the disaster recovery test was performed annually and the updated plan will be utilized for the 2018 disaster recovery exercise, and that a repeat exercise at this stage would be likely to have a negative impact on the ongoing UE2 deployments, as well as the hardware and software upgrades under way.

116. While noting the response of the Administration, the Board is of the view that a repeat exercise after attending to the actionable items emanating from the previous exercise would enhance the assurance of the business owners on the business continuity and disaster recovery capacity of the organization.

117. **The Board recommends that all the actionable items of the report on the disaster recovery exercise should be completed at the earliest opportunity and a repeat exercise of the updated disaster recovery plan should be conducted after hardware migration to ensure the disaster recovery preparedness of Umoja.**

V. Umoja deployment

A. Current status and risks

Developments during September 2016 to August 2017

118. The cluster 5 deployments of UE1 included implementation for national staff and individual uniformed personnel in special political missions and peacekeeping missions in November 2016. In addition, the ICSC package, phases 1, 2 and 3, were implemented in November 2016, January 2017 and January 2018, respectively, while the financial statements module for the financial statements of volume I for UNEP, UN-Habitat, UNODC, the international tribunals and ITC and phase 1 of the supply chain management were implemented by September 2017.

119. The Board gathered information from the process owners[9] about the current status of the functionalities implemented in UE1 and Umoja Integration. The Board was informed by process owners that they were largely satisfied with the implemented functionalities, and that a number of issues had been identified after the implementation of ICSC modules and supply chain management, phase 1; the relevant change requests to address those issues were submitted for continuous improvements and are in different stages of implementation.

120. The process owners also noted that adequate user training and user awareness had been provided to staff with respect to the above-mentioned implementation processes, and the Board was informed that 26 critical business intelligence reports had been developed under supply chain management, phase I; 6 reports had been

[8] Dated 6 July 2017.

[9] Department for General Assembly and Conference Management, Office of Programme Planning, Budget and Accounts, Office of Human Resources Management and Department of Field Support.

released in October 2017 and the remaining 20 reports had been completed and would be ready for release as of March 2018.

121. The Board appreciates the trend of successive deployments with fewer problems compared with implementation of previous clusters and is of the view that lessons learned should be proactively applied to ensure success in the deployment of UE2.

Ongoing implementation of Umoja Extension 2 modules

Strategic planning, budget formulation and performance management

122. The UE2 module is intended to enable the United Nations for strategic planning, better budget formulation and monitoring of programmes, budgets and projects while ensuring that measurable progress is made in achieving objectives and outcomes. The Board was informed that the project was on track and scheduled to be completed as per the target date of September 2018, while the first programme budget to be managed under the new solution would be the annual programme budget for 2020; the peacekeeping budget for 2019/20 and extrabudgetary resources from 2019 would also be implemented using the new solution.

123. The risks to the targeted completion, as perceived by management, are the technology risks arising from the combination of multiple technologies and tools that are required to address the unique requirements of the Organization and the non-availability of business experts in sufficient numbers.

Supply chain management (phases 2 and 3)

124. The implementation of the supply chain management project is intended to aid the global supply chain management for the United Nations. The supply chain management functionality will enable drawing on a global view of the supply chain, resulting in rapid, effective, efficient and responsible support to the Organization's operations. The Galileo[10] decommissioning project, the first phase of supply chain management, was implemented in September 2017. Further implementations under supply chain management involve the deployment of transportation management and event management, with the implementation of demand planning and supply network planning to follow subsequently. Considering the complexity of implementation, the ninth progress report of the Secretary-General (A/72/397) noted that a pragmatic implementation approach would seek to optimize software development by end-2018 and to establish a phased implementation in 2018 and 2019 while at the same time ensuring appropriate business readiness.

125. The Board was informed that transportation management and event management are on track for deployment in the fourth quarter of 2018. However, the exact timing of the deployment of demand planning and supply network planning was being finalized. Moreover, successful demand planning and supply network planning depend on organizational readiness for a global supply chain management solution, including master data and categorization of a high quality and a high-quality change management process, whose reliability poses a significant risk to the timely implementation of the project.

Implementing partners/grantor management

126. The project will enhance interaction with the Secretariat's implementing partners by providing a portal and tools for them to request funds from the Secretariat, record the progress of implementation and submit other performance details. It is

[10] Galileo is the warehouse and inventory management system used by peacekeeping and special political missions; it was decommissioned and migrated to Umoja in September 2017.

intended to cover the life cycle of planning for the use of implementing partners, first assessing their suitability and selecting them and then managing and evaluating their work. The Administration informed the Board that, by implementing that solution, the Secretariat intended to address concerns raised by donors and auditors and to develop the capacity for Organization-wide monitoring and analysis of implementing partners.

127. In the ninth progress report of the Secretary-General (A/72/397), it was stated that deployment of that solution is likely to be brought forward from end-2018 to September 2018 in order to synchronize with the deployments of the strategic planning and performance management and fundraising solutions. While proceeding with the deployment schedule, Umoja project management perceived it to be a high risk that SAP would not be able to mobilize resources in keeping with the timelines for its rapid deployment solution. That risk indeed materialized in March 2018 and a decision was made not to engage SAP and instead to organize project teams internally and augment skills. That module being the first implementation of its kind (implementing both grantor and grantee management), the inherent risk in implementation is higher, which was recognized by the Administration.

Reimbursements and payments to troop- and police-contributing countries

128. At present, the process for reimbursements to troop- and police-contributing countries involves many non-integrated systems, resulting in time-consuming data re-entry, risk of errors and difficulties in meeting payment deadlines. While the payments are processed through Umoja, several upstream processes are using multiple applications/databases, such as the electronic contingent-owned equipment application in peacekeeping missions, the government claims management system in the Department of Field Support and the troops database system in the Department of Management. As noted in the ninth progress report of the Secretary-General (A/72/397), the project is intended to provide an end-to-end solution for reimbursements/payments to troop- and police-contributing countries by eliminating data re-entry, introducing electronic approval workflows and providing consistent data for operational, strategic, financial and budgetary reporting, with a target date of deployment by end-2018.

129. The product road map for implementation of the project has been finalized and development is currently under way, scheduled for December 2018 to cover the quarterly payments that will be processed starting in that month; hence the focus will be on developing the functionality to allow the needed replacement of the government claims management system. The Administration also informed the Board about the challenge of managing the scope, which was not so clear or broad when the project first captured its requirements and defined its resources and timelines. Additional needs, if substantial, may require an additional release. The Board was also informed that non-availability of the required skills for the project at a reasonable price in the market could have a significant impact on deployment schedules.

Force management

130. Force management functionalities are intended to manage efforts to set up a new mission or to adapt an existing mission, using system-generated templates and/or adjusting the number of positions and related logistics/infrastructure components. Although in the ninth progress report of the Secretary-General (A/72/397) the planned deployment date had been given as end-2018, it was also noted that deployment would depend on how the business requirements matched the functionality of the defence force planning module.

131. The Board noted that the business process owners for force management and reimbursements and payments to troop and police-contributing countries are the same and the priority is implementation of the latter process. The business requirements of the force management module has not been finalized to date and there is little clarity on the business value of its implementation. The requirements, solution architecture and technology elements for the project had not yet been finalized as of March 2018; hence, implementation of that functionality by December 2018 seems unlikely.

Conference and event management

132. The conference and event management project covers the life cycle of conferences and events, from planning to implementation and post-implementation evaluation, including calendar and non-calendar conferences and meetings, off-site conferences and meetings and special events. This will involve planning the entire life cycle of events, which requires integrating the module with existing applications like iNeed, the existing enterprise system for service management, and gMeets, the Secretariat's electronic meetings scheduling and resource allocation system. The plan was to integrate iNeed with Umoja, primarily for cost recovery and billing and also for development of functionalities related to meeting participants management. As per the ninth progress report of the Secretary-General (A/72/397), the solution is targeted to be rolled out by end-2018.

133. The Board noted that iNeed integration work was currently under way, with planned deployment by September 2018. For meeting participants management, the open-source software INDICO was identified as the preferred solution and its deployment and rolling out is expected to commence in the fourth quarter of 2018.

Fundraising and donor relationship management

134. The Umoja fundraising module will provide the functionality to register and maintain donor profiles and interact with donors throughout the life cycle, from the appeal for funds to the signing of the grant agreement. The fundraising module will support programme managers in analysing their prospective donors, launching appeals, publishing them online, planning media events and following through with interested donors until the conclusion of a grant agreement.

135. In the ninth progress report of the Secretary-General (A/72/397), it was mentioned that owing to synergies with the strategic planning and performance management and the implementing partner projects, the deployment of this solution will most likely be synchronized for September 2018; the development of the product is under way. Other than the risk of pressure on process experts owing to concurrent work streams, the project was on track for its deployment as targeted in September 2018.

Risks to the timely implementation of projects

136. Overall, on the basis of the responses received from the Umoja team and process owners, the Board infers a possible risk of delay in the deployment of some of the above-mentioned modules for the following reasons:

(a) The business requirements of United Nations are unique and several new functionalities are being developed for the first time for the Secretariat, which may raise unforeseen issues;

(b) The Umoja project management team finds that there is limited availability of suitable skills at a reasonable price in the market for the intended products and solutions. There is also a shortage of business process experts and an

increased need for coordination between different stakeholders such as the Umoja team, vendors and business process owners;

(c) Possible incompatibilities between untested combinations of technologies could lead to unforeseen problems in the deployment phase. Some modules also involve complex data conversions or significant data enrichment;

(d) There are additional challenges in the implementation of the modules, which involve significant change management. It is also likely that the ongoing management reform may introduce new requirements for the Umoja system. The project management team informed the Board that although the timelines proposed in the ninth progress report of the Secretary-General (A/72/397) may not be affected, the team will face more resource pressure which it is preparing to address.

Implementation timelines

137. ACABQ had noted in its report (A/72/7/Add.31) that the Secretary-General is proposing to extend the timeline for the full deployment of UE2 into 2019; it was provided with an updated version of the chart depicting the Umoja schedule and workplan for 2016–2018 (see A/72/7/Add.31, annex I). In the context of the risks and challenges cited above, the Board is of the view that although the updated timelines do not extend any of the completion dates into 2019, some of the projects might actually extend into 2019.

B. SAP upgrade

138. SAP delivers updates to its core applications in the form of full versions, enhancement package and support packages. SAP support packages are bundles of fixes to an existing functionality and do not usually introduce a new functionality. Enhancement packages are updates within versions that can be relatively major updates and introduce new functionalities or features.

139. Umoja software needs to be upgraded by 2020 to receive continued vendor support. The Administration initially decided in 2017 to implement the enhancement package upgrade of the current SAP software version to the latest versions. A key reason driving that decision was the introduction of SAP software for public service organizations called NPO+ (Not-For-Profit Organization). Apart from performance improvements, management anticipated additional features available in newer supplier relationship management releases that have immediate operational benefits and easier troubleshooting of incidents escalated to SAP as significant benefits of the upgrade. As per the ninth progress report of the Secretary-General (A/72/397), the upgrade was scheduled to be completed by September 2018. The strategy of management was to avoid pressure later by upgrading with a larger functionality footprint and potentially greater disruption to business.

140. The Administration informed the Board that the timeline had been revised for the following reasons:

(a) An evaluation of the coverage and timeline of the SAP/NPO+ functionality had shown that the implementation of SAP/NPO+ would only partially replace the existing functionality, while the NPO+ delivery timeline (instalments ending in June 2018) posed a significant risk to the UE2 deployment timeline;

(b) The Administration had detected a significant software incompatibility during the implementation of ICSC changes.

141. The Administration informed the Board that in order to mitigate the risk to UE2, it had been decided to postpone the upgrade to 2019, subject to the availability,

reliability and coverage of the NPO+ functionality. The Administration also informed the Board that the issues were being taken up with SAP and the timing of the upgrade in 2019 would be influenced considerably by the outcome of the consultations with SAP. The Administration, however, was confident that the delay would not have any operational impact on, or limitations for, the ongoing software development for UE2.

142. In parallel, the Administration has also decided to upgrade HANA[11] software from the platform edition to the enterprise edition and to upgrade to HANA 2.0, combined with a replacement of the underlying hardware which is due for replacement. The HANA 2.0 upgrade is currently scheduled for mid-2018 and final dates will be confirmed once the hardware contract is finalized.

143. The Board noted that the Administration had assessed the implications and risks involved in the SAP upgrade and was in the process of choosing the most suitable option.

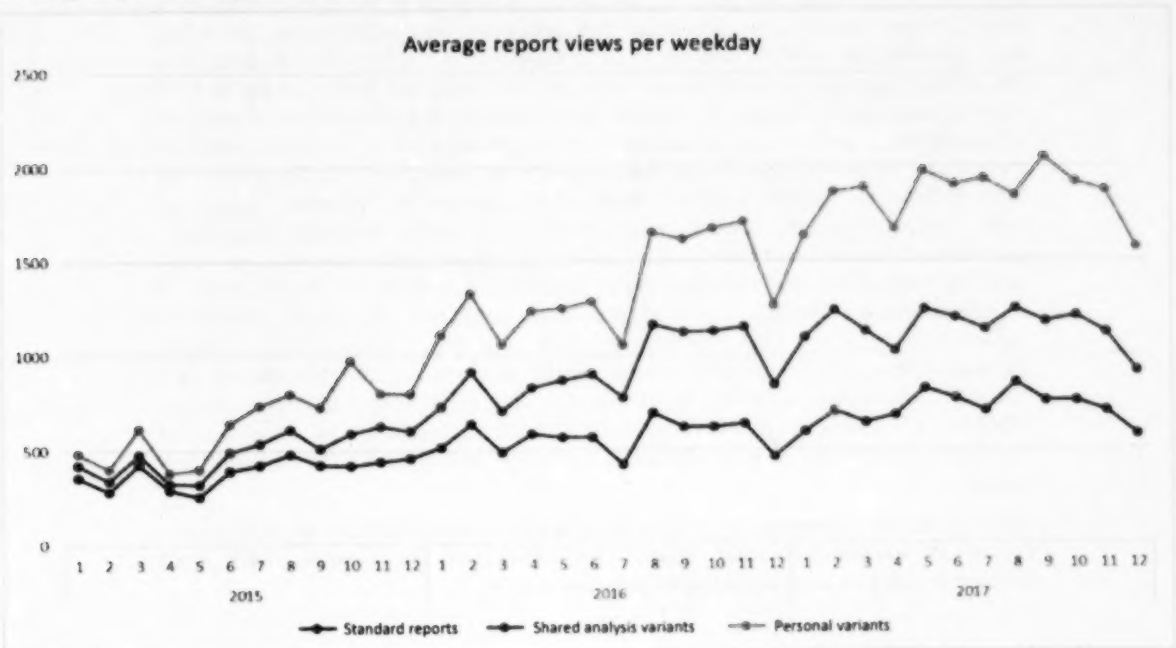
C. Business intelligence reporting

144. An important qualitative benefit of Umoja is timely availability of relevant information to stakeholders. Business intelligence reporting is envisaged as a key vehicle for that information flow. Considering its importance, in its sixth annual progress report (A/72/157), the Board noted a number of issues regarding business intelligence functionality, such as limited usefulness of reports on account of poor data quality, low frequency of usage of business intelligence reports and the need for creation of new reports.

145. The details of the average report view per weekday during the period 2015–2017 were provided to the Board, as indicated in figure 1.

[11] SAP/HANA is an in-memory, column-oriented, relational database management system developed and marketed by SAP. Its primary function as a database server is to store and retrieve data as requested by the applications. In addition, it performs advanced analytics and includes extract, transform and load capabilities, as well as an application server.

Figure I
Average report views per weekday, 2015–2017


Average report views per weekday
2500
2000
1500
1000
500
0
1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
2015
2016
2017
Standard reports
Shared analysis variants
Personal variants

Source: Data provided by Umoja project management.

Key

Standard reports: the set of standard reports made available in the Umoja business intelligence portal for business intelligence users; blue line indicates views of standard reports.

Shared analysis variants: Umoja allows users to create business intelligence reports and share them with others; if a user has to share a report, it must be stored in the shared analysis folder of the business intelligence portal; orange line indicates number of views of reports shared by users.

Personal variants: Umoja allows users to save a combination of filters that they use frequently so they don't have to re-enter the filters each time they generate a particular report, thus personalizing the reports; grey line indicates number of views of personal variants created by users.

146. The Board noted from the views per week that personal variants were favoured to standard reports, indicating that the standard reports are still not fulfilling the perceived needs of users, resulting in the creation of a higher number of shared analysis variants and personal variants.

147. To address issues related to business intelligence, the Umoja business intelligence team prepared a detailed implementation plan in July 2017, including estimations of resources. Tasks related to semantic layer[12] redevelopment in various modules and upgrades of system software were identified. Based on complexity of tasks and timely availability of technical manpower resources, the duration and time frame of each task was identified.

148. The Board was informed that key deliverables related to the upgrading of SAP Business Warehouse and HANA had been accomplished in 2017, and that 7 mandatory and 20 high-priority reports had also been developed simultaneously with the implementation of the Galileo decommissioning project. Enrichments had

[12] A semantic layer is a business representation of corporate data that helps end users to access data autonomously using common business terms: it maps complex data into familiar business terms, such as product, customer or revenue, in order to offer a unified, consolidated view of data across the organization.

been made in semantic layers of accounts payable and human resources modules, which were ready for user acceptance.

149. The Board noted that the work related to enrichment of the semantic layers in general ledger, accounts receivable, payroll, real estate and supply chain, which had been planned during 2017, had yet to be initiated. It was informed that there were competing priorities on both the business and the technical teams owing to UE2 ongoing projects and inadequate capacity because of resource constraints. It was also informed that priority would be accorded to the development of semantic layers for areas where there was capacity and there would be no impact on UE2. For some areas such as finance, the data models in Business Warehouse/HANA would need to be redesigned to support the new UE2 requirements, for example the budget formulation and strategic management functionality under UE2. In such cases, the redesign would have an impact on the semantic layer itself and therefore the enrichments or enhancements to semantic layers at this stage might not be fruitful before the implementation of the UE2 functionality itself. The Board acknowledges that the implementation of UE2 projects would significantly impact the data models and business intelligence reporting in the future. This is important because the data integrity of business intelligence reporting is primarily dependent on enhancements in semantic layers and is a key factor in realizing qualitative benefits arising from Umoja.

150. **The Board recommends that work related to the enrichment of the semantic layers of various modules should be prioritized in tandem with UE2 developments and accomplished expeditiously.**

D. User training

151. In its resolution 71/272 A, the General Assembly stressed the importance of effective and high-quality training for the successful implementation of Umoja. In addition, in its sixth annual progress report (A/72/157), the Board of Auditors took note of developments in training, underscored that the training of end users was essential for the successful implementation of any system and recommended that mandatory training be provided to all users before the deployment of any functionality and that feedback received should be taken into account when designing the training curriculum.

152. The Board was informed that 9,519 participants had been trained in various Umoja-related courses in 2017. In addition, the Board noted that the Administration had conducted post-go-live surveys after cluster 4 and 5 deployments, which had also assessed the overall satisfaction with various aspects of Umoja, including training.

153. The Board was informed that of 1,655 respondents who had participated in the cluster 4 post-go-live survey, 44 per cent had agreed that training materials were accessible and 37 per cent had positive views on the availability of training sessions. However, the Board noted that 34 per cent of the participants had expressed positive views and the same percentage had expressed negative views regarding the timeliness of the training before going live.

154. In the cluster 5 post-go-live survey, of 1,971 participants, 66 per cent had positive views about the quality of training. The ability to apply the knowledge and skills gained during training, as well as the confidence to share what they learned with colleagues, were also rated positively. The Board was informed that the timeliness of training prior to going live was rated positively by 56 per cent of the participants.

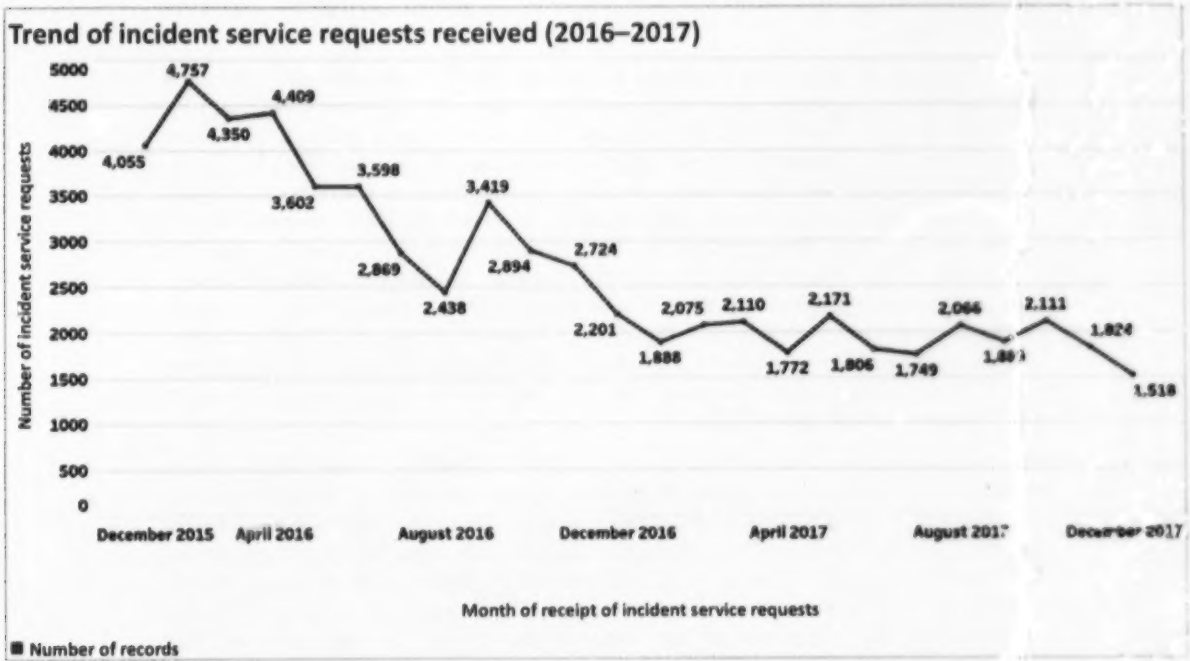
155. In addition, in both the surveys conducted, recommendations made by users for improved training called for hands-on training, training in the field, smaller-sized

sessions, increased time for training, experienced trainers, user-friendly online training and provision of relevant course materials. As noted by the Board in its previous report (A/72/157), the feedback received from users should be factored into the design of the curriculum and structure of future training programmes.

E. User problems resolution

156. The Umoja support model is structured on three levels to best serve users and is designed to achieve self-sufficiency in each location and provide efficient processes and expertise for the resolution of incidents and the fulfilment of service requests. The first level of support operates through local process experts, trained service desk personnel, communities of practice and other resources, supporting the vast majority of incidents and service requests. The Umoja support centre in Brindisi and the United service desk, operating from Bangkok, Geneva, Nairobi and New York, provide the second level of support. Those integrated service desks act as the single point of contact for incident or problem management and service requests and if required, escalate such requests to the third level, i.e., to process and technical experts working in global teams who specialize in business processes or technical components in Umoja.

Figure 2
Overall trend of incident service requests



157. Umoja-related incidents have been declining steadily (see figure 2) and are reasonably stable, with an average of 5,700 service tickets per quarter by 2017. The Board noted that the first-call resolution rate[13] for 2017 stood at 61 per cent, up from 54 per cent in 2016. The Administration, agreeing that it was good business practice to continue to reduce the number of issues escalated to higher tiers, informed the

[13] Service requests (closed + resolved + cancelled) without work orders/service requests (closed + resolved + cancelled).

Board that the Umoja production support approach had relied on strengthening the role of local process experts to increase access to local support and reduce tickets, and also to progressively strengthen the capacity of the lower tiers in order to reduce the escalation of tickets to higher tiers. However, the Administration indicated that the aggressive pace of Umoja's deployment and the continuing design, build and deployment of UE2, had not allowed process owners adequate time and resources to provide additional support to the Unite service desks to improve first-call response rates.

158. **The Board recommends that the Administration prescribe a first-call resolution rate and an action plan to achieve the same within a reasonable time frame.**

F. Change management and continuous improvements

159. A change is defined as any activity that alters the scope, schedule, deliverables or costs of the Umoja solution or its deployment. Change management is the process that ensures that all changes are processed in a controlled manner, including standard changes and emergency maintenance relating to business processes, applications and infrastructure. The main purpose of change management is to enable fast and reliable delivery of change to the business and mitigation of the risk of having negative impacts on the stability or integrity of the changed environment. A robust change management process provides management with the assurance that only authorized and tested changes to systems and infrastructures are implemented in the production environment.

160. The Umoja office has established a change request management governance framework and a process framework, including the Change Control Board and the Change Advisory Board. The Organization has documented standards, processes, procedures and guidelines for identifying and approving change requests. The change requests initiated from the various sources are submitted to the Change Control Board, which reviews all change requests for approval or other action; it meets weekly to review pending change requests. In addition, emergency meetings may be organized at the discretion of the Change Control Board. The approved change requests are taken to development, testing and migration to production. In some cases, if the project director finds that the change requests significantly impact scope, schedule, budget or deliverables, they are escalated to the Change Advisory Board. The Board of Auditors was informed that only one change request was escalated to the Change Advisory Board in 2017.

161. At present, the Umoja office is using a JIRA[14]-based tool called "Rapport" as a repository to maintain and track all the change requests made by business process owners. As of February 2018, 2,362 change requests had been recorded in the Rapport system. The Board was informed that the Administration was planning to implement the solution manager ChaRM in the future, which would help to track all the continuous improvement items in one place, from the stage of creation of change requests till the migration of the item to the production environment. The Administration also stated that the design phase for the application management related to ChaRM was complete and the implementation plan for the realization phase was under evaluation.

[14] JIRA is a tool developed by the Australian Company Atlassian; it is used for bug tracking, issue tracking and project management.

162. The Board is of the view that the implementation of SAP-based integrated monitoring through ChaRM will enhance the monitoring of the implementation of change requests.

Pendency in reviewing change requests made by business users

163. An analysis of the rapport database indicated that there were 235 change request[15] items requested by business users that were pending for review, of which 41 change requests had been pending for more than one year. The Administration informed the Board of Auditors that it would review Change Control Board requests with a long pendency and convene a meeting to analyse all of them, along with Umoja functional teams and business process experts.

164. **The Board recommends that change requests pending for more than one year should be reviewed by the Change Control Board within a reasonable time frame.**

Prioritization of approved change requests

165. Once the change request is approved after review by the Change Control Board, the item is identified for implementation. One change request may result in multiple implementable change items, which may be of the nature of continuous improvements, bug fixes or changes required in software on account of operational issues. It is essential to prioritize those change request items, depending on their relative impact. As of 11 March 2018, of the 9,744 change items[16] approved by the Change Control Board for implementation, in the integration testing tracker in Rapport, 654 basis-related activities and seven production service request items (661 items in total) were not indicated with a priority or target date for completion.

166. **The Board recommends that on initial review, a priority should be attached to every change request and a likely target date for implementation should be established.**

167. The Board was also informed that it had become imperative to prioritize change requests so that they do not have an impact on ongoing UE2 projects; given that the UE2 workplan is to be executed alongside a major reorganization of resources with a view to downsizing the project team, continuous improvements are undertaken whenever capacity permits. The Board was further informed that the resources for change requests were to be absorbed within the approved Umoja budget. The Board is of the view that both UE2 implementation and continuous improvements should go in parallel and that the change requests which are directly relatable to potential for benefit realization should be accorded the high priority.

168. **The Board recommends that operationally imperative change requests and those directly relatable to potential for benefit realization, as long as they do not impact UE2 project deliverables, should be prioritized to ensure continuous improvements to the Umoja system.**

G. Mainstreaming Umoja

169. In its resolution 70/248 A, the General Assembly requested the Secretary-General to develop detailed transition plans for the long-term support and

[15] As of 11 March 2018.

[16] One change request made by a business user may correspond to many change items; this is done to break the requirements into manageable tasks which may or may not be independent of each other.

mainstreaming of the Umoja solution, to be provided by the Chief Information Technology Officer. In addition, in its resolution 71/272 B, the General Assembly reiterated the importance of ensuring a smooth and timely transfer of responsibilities from the Umoja project to corresponding entities within the Secretariat.

170. The Board was informed that there are plans to eventually mainstream the project team into the business team, as well as the Office of Information and Communications Technology; the main part of the project team is expected to be mainstreamed into the Office of Information and Communications Technology and to remain as an integrated team to support the maintenance of, and continuous improvements to, Umoja functionalities. Equally importantly, a part of the team is also expected to be mainstreamed into the business area, specifically the process owners. With the proposed management reforms, it is conceivable that a business transformation function might be created, in which case a part of the team is likely to be mainstreamed into that function. The expectation is that the solution architecture and delivery management teams will be gradually merged, the technical projects team will be abolished and the Continuous improvements and business transformation teams will be augmented. When the project ceases to be a project (based on the decision of the General Assembly), the expectation is that the Umoja team at that point will be mainstreamed, the delivery management team will be mainstreamed into the Office of Information and Communications Technology and the business transformation team into the business transformation function that is likely to have been created by then.

171. On enquiring about the readiness for mainstreaming, the Board was informed that the mainstreaming process will be a complex transition, involving the reprofiling of resources, the reorganization of functions and the cross-training of personnel, while also downsizing the project team and building capacity in the business areas. It was informed that some work streams are already being executed through the Office of Information and Communications Technology/Enterprise Application Centre, thus obviating the need for separate mainstreaming in such cases. In planning the build-up and deployment of UE2, the process owners and their personnel were also heavily involved owing to areas such as master data governance being continually mainstreamed into the business process. The Board was also informed that the reorganization of the Umoja project team into smaller, tightly integrated teams also paves the way for a smoother mainstreaming after the deployment of UE2. Some of the mainstreaming activities have been slowed down deliberately owing to the impact of ongoing UE2 development.

172. The Board is of the view that, in preparing the mainstreaming plan, it is important to consider various factors, such as the ongoing reform agenda, the timelines of UE2 deployments and the large scope for continuous improvements in Umoja functionalities. Umoja stabilization may require some time after full functionality deployments. Moreover, the scope for improvements in functionality through continuous improvement programmes is likely to extend beyond the mandated project period.

173. **The Board recommends that the Umoja transition plan for mainstreaming should continue to factor in the potential impact of the Secretary-General's reforms, the timelines of UE2 deployment and the requirements for continuous improvements in various modules.**

VI. Acknowledgement

174. The Board wishes to express its appreciation for the cooperation and assistance extended to its staff by the Under-Secretary-General for Management and the project director, together with the members of their staff.

(*Signed*) Rajiv **Mehrishi**
Comptroller and Auditor General of India
Chair of the Board of Auditors
(Lead Auditor)

(*Signed*) Mussa Juma **Assad**
Controller and Auditor General of the
United Republic of Tanzania

(*Signed*) Kay **Scheller**
President of the German Federal Court of Auditors

Annex I

Status of implementation of recommendations up to the year ended 31 December 2016

No.	*Year*	*Report*	*Paragraph*	*Recommendation*	*Administration comments on status — March 2018*	*Board comments on Status — March 2018*	*Fully implemented*	*Under implementation*	*Not implemented*	*Overtaken by events*
1	2013	A/68/151	16	The Board recommends that the Administration design, communicate and implement a plan to exploit the defined benefits of up-to-date and consolidated data from the ERP system, including how it intends to develop staff capability to realize both qualitative and quantitative benefits of improved information.	**Administration comments:** We would urge the Board to consider linking this to the recommendation contained in paragraph 23 (c) of A/71/180 (2016) as an integrated recommendation, focusing more on the qualitative benefits, which formed the primary business case for Umoja, rather than the quantitative benefits. The Administration will address this explicitly as part of the external consultancy in order to derive the benefit of good practices from other public-sector ERP implementations.	The Board notes the Administration's response and considers the action under the recommendation to still be under implementation.		X		
2	2013	A/68/151	26	The Board recommends that the Administration designs a robust methodology which clearly defines, (a) the current status of operational performance in each business unit regarding time, cost, quality, (b) the level of future performance to be achieved post-implementation, (c) the approach and investment involved to achieve the future performance target, and (d) how the benefit achieved will be measured and reported.	**Administration comments:** The operational indicators project speaks to this. It would, however, be some time before all the issues covered can be fully addressed owing to the breadth of the recommendation. The Board could consider rewording it or acknowledging the effort and the fact that this would be a significant undertaking over a longer period of time.	The Board notes the Administration's response and considers the action under the recommendation to still be under implementation.		X		

No.	*Year*	*Report*	*Paragraph*	*Recommendation*	*Administration comments on status — March 2018*	*Board comments on Status — March 2018*	*Fully implemented*	*Under implementation*	*Not implemented*	*Overtaken by events*
3	2013	A/68/151	81	The Board recommends that the CITO prepare an overarching commercial strategy which seeks to (a) optimize the value from major suppliers to the ERP project, balancing cost and risks to delivery; and (b) sets out the parameters against which all future procurements should be undertaken.	**The Administration requests closure of this recommendation.** Procurement for the project is almost complete. This recommendation would be more appropriately placed in the Board's annual progress report on the implementation of the information and communications technology strategy.	The Board notes the Administration's response and considers the recommendation as having been overtaken by events.				X
4	2012	A/67/164	32	The Board also recommends that the Administration establish a formal approach to managing and improving business processes to enable continuous reform and improvement following implementation of the ERP system.	**The Administration requests closure of this recommendation.** A programme for monitoring continuous improvements has been created to ensure the sustained realization of Umoja benefits. Umoja is based on 321 engineered processes to ensure that the critical administrative functions of the Organization can be executed to meet operational objectives. Umoja transactional users globally are carrying out not only specific functional roles but also responsibilities within a workflow or sequence of tasks. The timely and accurate completion of a workflow is crucial for the successful delivery of services for the Organization to fulfil its mandate. The programme represents the Organization's commitment to manage the performance of administrative functions to ensure that they serve the Organization as intended (see A/72/397, paras. 134–138).	The Board notes the Administration's response and considers the recommendation as implemented.	X			

No.	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
5	2014	A/69/158	Summary, 29 (c)	Continue to embed the concept of process ownership through strengthening the partnership with heads of business units.	**The Administration requests closure of this recommendation.** While we fully agree with this recommendation, it has already been implemented in practice, as process owners sign off on all changes and they actively work with all business units to ensure adoption. In the context of the global service delivery model, we have also suggested that the Client Board (for giving a voice to clients) should also be leveraged by Umoja for its continuous improvements programme to avoid duplication and for better synergy.	The Board notes the Administration's response and considers the recommendation as implemented.	X			
6	2015	A/70/158	Summary, 19 (a)	Increase the degree to which Umoja is actively and visibly led by all heads of business units, with support from process owners and Umoja project management. Deployment of Umoja has reached a key juncture where business leaders must be seen to own the solution and drive its development going forward.	**The Administration requests closure of this recommendation.** There is sufficient evidence that all business units (heads) already embrace Umoja. It has become a part of the normal work of all departments, as evidenced by the Board's production support audit observation. As also mentioned in the Board's project governance audit observation response, there is no evidence of any requirement to date for the project to escalate any issues to the Umoja Steering Committee or Management Committee despite the challenging resource-constrained environments in which we are operating. So, while their continued engagement is key to Umoja's success, the recommendation as worded can be treated as implemented, as evidenced by the stable operations and the success of the latest deployments, with no major problems at all. In addition, the compacts of Under-Secretary-Generals with the Secretary-General continue to stress the involvement of each department in ensuring success and their performance is also evaluated annually.	The Board notes the Administration's response and considers the recommendation as implemented.	X			

No.	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
7	2015	A/70/158	Summary, 19 (c)	Independently review the estimated capacity required across the support model to meet expected demands following cluster 3 and 4 deployment and take action to address any gaps. The demand for support after Umoja Foundation was deployed overwhelmed the support structures in place at the time, and there continues to be greater demand on regional and central support functions than planned. Effective and timely support is essential for clusters 3 and 4, especially given the geographical spread and considerable increase in the number of users who will require support.	**The Administration requests closure of this recommendation.** Clusters 3 and 4 were successfully supported.	The Board notes the Administration's response and considers the recommendation as implemented.	X			
8	2015	A/70/158	Summary, 19 (d)	Review the timing and adequacy of funding arrangements for the rationalization of the ICT help desks to minimize any risks to in the provision of support to Umoja. The Office of Information and Communications Technology needs to plan and manage its implementation of the global support model in conjunction with delivering the effective provision of Umoja support.	The Office of Information and Communications Technology requests closure of this recommendation. The Office established a single unified help desk (Unite Service Desk) that provides 24/7 support for enterprise applications, including Umoja. Unite Service Desk hubs are located in New York, Bangkok, Nairobi, Geneva and Brindisi and became operational in September 2014. Funding was provided by regular budget and extrabudgetary resources.	The Board notes the Administration's response and considers the recommendation as implemented.	X			

No.	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
9	2015	A/70/158	Summary, 19 (f)	Refresh the Umoja business case drawing on the experience of the Department of Field Support and clusters 3 and 4. The update should reflect realistic assumptions including the ability of the Administration to flexibly deploy staff	**The Administration requests closure of this recommendation.** The updated business case was presented to the General Assembly in the ninth progress report of the Secretary-General (A/72/397).	The Board notes the Administration's response and considers the recommendation as implemented.	X			
10	2016	A/71/180	Summary, 23 (a)	The Board recommended that the Administration assess the challenges facing the project and develop prioritized and fully costed options to implement the remaining scope of the Umoja solution.	**The Administration requests closure of this recommendation.** Fully costed options were presented to the General Assembly in the ninth progress report of the Secretary-General (A/72/397).	The Board notes the Administration's response and considers the recommendation as implemented.	X			
11	2016	A/71/180	Summary, 23 (b)	The Board recommended that heads of business units address user training needs as a matter of urgency by: (i) performing skills needs analysis to identify training requirements for users in each business unit; (ii) developing a costed training plan for delivering the required training; and (iii) maintaining an up-to-date skills matrix, so that appropriate training can be provided as staff leave and new staff join.	**The Administration requests closure of this recommendation.** Inspira, the enterprise learning management system, has been enhanced to enable managers to track and address training gaps by linking training completion to Umoja enterprise roles; an enterprise-role-to-course mapping tool enables staff members, managers and security liaison officers to review the status of courses completed. Umoja user roles can be approved or rejected on the basis of course assessments recorded in Inspira. Local process experts and process experts certified by process owners, as well as a subset of those process experts identified as trainers, are tracked through Inspira. Reporting tools therefore institutionalize the continuous monitoring of training information, including through analysing users' ability to use the system by tracking their actions when performing tasks, as explained in paragraphs 134–138	The Board notes the Administration's response and considers the recommendation as implemented.	X			

No	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
					of the ninth progress report of the Secretary-General (A/72/397). Training is absorbed as an indirect cost.					
12	2016	A/71/180	Summary, 23 (c)	The Board recommended that the Administration ensure business units are supported in the application of the approach developed to identify and realize the benefits from improved ways of working; this should include providing access to skills and capability in operational improvement and holding business areas to account for delivering the expected benefits.	**Administration comments:** for quantitative benefits, the Board may wish to note that there is not a 1-to-1 ability to reap the benefit for a given department owing to the full-time equivalent benefit and the instruction to adapt work to meet net reduction targets without any impact on mandate delivery. The recommendation is valid if it addresses the qualitative benefits and this will be covered through the external consulting arrangement for a benefit realization plan that addresses the sustainable value-creation of Umoja.	The Board notes the Administration's response and considers the recommended action to be under implementation.		X		
13	2016	A/71/180	23 (d)	The Board recommended that the Administration calculate the total cost of ownership of Umoja over its proposed operating life.	**The Administration requests closure of this recommendation.** The total cost of ownership was presented to the General Assembly in the ninth progress report of the Secretary-General (A/72/397).	The Board notes the Administration's response and considers the recommendation as implemented.	X			
14	2016	A/71/180	23 (e)	The Board recommended that the Office of Information and Communications Technology and process owners develop detailed mainstreaming plans and seek approval for the required funding at the seventy-first session of the General Assembly.	**This recommendation is in progress.** The Umoja transition plan for mainstreaming factors in the potential impact of the Secretary-General's reform, the timelines of UE2 deployments and the requirements for continuous improvements in various modules.	The Board notes the Administration's response and considers the action under the recommendation to still be under implementation.		X		

No.	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
15	2017	A/72/157	32	The Board recommends that mandatory training should be provided to all users before the deployment of any functionality. The feedback received should be taken into account when designing the curriculum.	**The Administration requests closure of this recommendation.** For cluster 5, 100 per cent of transactional users and 95 per cent of self-service users had completed training prior to deployment. For the decommissioning of Galileo, in September 2017, training was conducted in three cycles to ensure proper coverage; a training academy in Valencia has strengthened the capabilities to support Umoja field deployments. Inspira has also been enhanced to enable managers to track and address training gaps by linking training completion to Umoja enterprise roles; an enterprise-role-to-course mapping tool enables staff members, managers and security liaison officers to review the status of courses completed. Umoja user roles can be approved or rejected on the basis of course assessments recorded in Inspira. Local process experts and process experts certified by Process Owners, and a subset of those process experts identified as trainers, are tracked through Inspira. Reporting tools therefore institutionalize the continuous monitoring of training information, including analysis of users' ability to use the system by tracking their actions when performing tasks, as explained in paragraphs 134–138 of the ninth progress report of the Secretary-General (A/72/397). The project has also introduced user experience management as part of its software development in an effort to improve the usability of systems and reduce the need for training. Feedback through surveys is integral to the training strategy.	The Board notes the Administration's response and considers the recommendation as implemented.	X			

No.	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
16	2017	A/72/157	42	The Board recommends that the Administration, in consultation with the users of reports, prepare a comprehensive plan for the configuration of business intelligence reporting with the objective of incorporating frequently used reports into the standard corporate reports.	**This recommendation is in progress.** Our configuration of business intelligence plan includes assessment of how the business intelligence paradigm shifts with the strategy management application; an exercise to review existing reports, as well as to look at a process for review on an ongoing basis including to classify corporate reports, with the concurrence of the process owners.	The Board notes the Administration's response and considers the recommended action to be under implementation.		X		
17	2017	A/72/157	47	The Board recommends that the Administration take appropriate mitigating action to manage the risks identified in the assurance project and present the status of the implementation thereof in the next progress report to the General Assembly.	**This recommendation has been overtaken by events.** An assurance road map was drafted in the third quarter of 2017 and, after being shared informally with the process owners and project owner, was formally presented to process owners and business readiness managers in December 2017 and January 2018, respectively, for them to review its details; however, while the detailed proposals for the restructuring of the Department of Management, the Secretary-General's management reform and the global service delivery model are being prepared, the assurance road map review has been put on hold. Since the remaining assurance project risks are at the highest level, the mitigating action is now advanced and integral to these larger goals, with Umoja as an enabler.	The Board notes the Administration's response. The Board agrees with the Administration that mitigating action in respect of high-level risks is integral to the larger goals of restructuring, and therefore considers this recommendation to have been overtaken by events on account of the reform initiatives of the Secretary-General.				X
18	2017	A/72/157	54	The Board, while noting the response of the Administration, recommends that procedures be put in place to ensure that data accuracy and reliability are strictly adhered to in the migration of the	**The Administration requests closure of this recommendation.** The Board of Auditors has audited the Galileo decommissioning project, including the Project's data conversion strategy providing the overall scope of the data conversion process in the context of document A/72/5 (Vol. II).	The Board notes the Administration's response and considers the recommendation as implemented.	X			

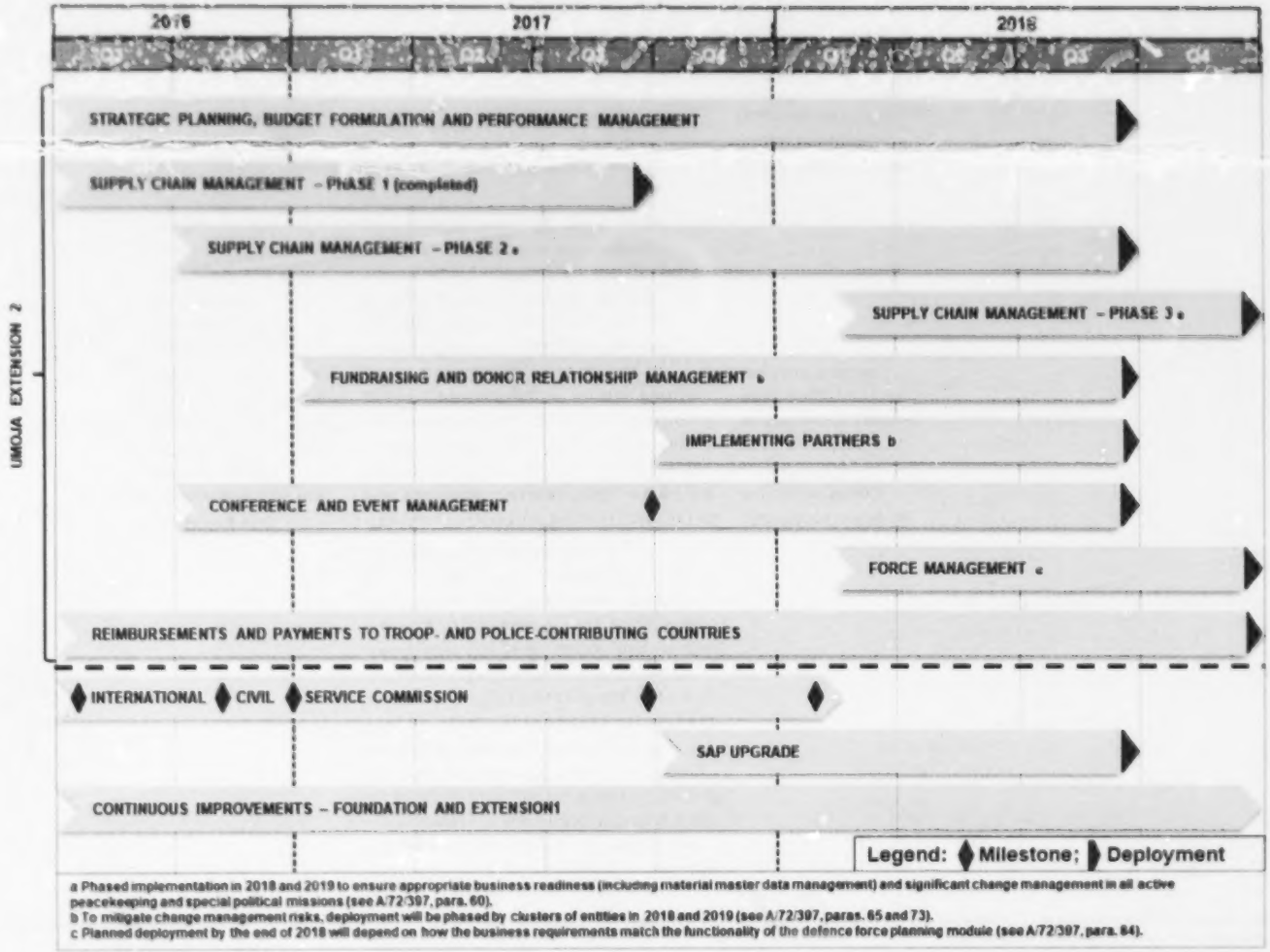
No	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
				inventory data from the legacy systems to Umoja.						
19	2017	A/72/157	63	The Board recommends that the Administration consider implementing time sheets for tasks relating to the implementation of Umoja to fully capture the indirect costs and take steps to account for the costs incurred in training in terms of staff time and travel in the calculation of the total cost of ownership of Umoja.	**The Administration requests closure of this recommendation.** In order to implement a time sheet process to track indirect costs, a large overhead cost would be incurred. A manual reporting system to capture the time distribution for over 10 UE2 projects for an estimated 1,500 staff would need to be developed and would involve considerable resources. Regarding travel for training, while taking note of the ACABQ request that *"pending customization of Umoja, efforts will be made to estimate the travel costs of Umoja trainees and to update the estimates of the total cost of ownership of Umoja accordingly"* (A/72/7/Add.31, para. 37), we remain guided by the General Assembly principle that *"customization of the ERP software should be kept to a minimum, to avoid unnecessary costs"* (A/62/510/Rev.1, para. 22 (c)). We have explored the calculation of travel for training and have concluded that this would entail a labour-intensive effort well exceeding the value of any result.	The Board notes the Administration's response and considers the recommendation to have been overtaken by events.				X
20	2017	A/72/157	70	The Board recommends that the figures in the updates to the benefit realization plan to be submitted to the General Assembly in respect of the decrease in process/activity time be calculated on the basis of time stamp figures where such figures are available in Umoja.	**The Administration requests closure of this recommendation.** Our continuous improvements monitoring programme was devised based on the Board's comments about using time stamps. We initially applied it to workflows that captured the full life cycle of transactions, but the methodology also applies to all processes although we have to use KNOA software and other tools to construct the flow for non-workflow transactions. This is not feasible in all cases retroactively. We had explained that	The Board notes the Administration's response and considers the recommendation to be implemented.		X		

No.	Year	Report	Paragraph	Recommendation	Administration comments on status — March 2018	Board comments on Status — March 2018	Fully implemented	Under implementation	Not implemented	Overtaken by events
					the recalculation of the benefits figures on this basis is not practical but can form the basis for measuring improvements continuously in the future, which is more meaningful than just the quantification of the benefit (applicable only in a limited number of processes included in the benefits case). Since most of the forward-looking benefits (supply chain, IT) are not even linked to such an analysis, we would urge the Board to consider treating this as implemented in the light of the detailed and extensive processes put in place for the programme and the proof of our capabilities in that regard.					
21	2017	A/72/157	71	The Board also recommends that the updated benefit realization plan, after approval by the General Assembly, be frozen to serve as the baseline for the monitoring of the future benefit realization that will arise from the use of Umoja.	**The Administration requests closure of this recommendation.** Again, we would urge the Board to look at our continuous improvements monitoring programme as the method of providing a baseline to monitor process improvements. Perhaps the recommendation can revised to request that the Administration devise a way to measure other processes not covered by workflows but deemed important for qualitative benefits (faster, nimbler, easier or less-error-prone processes to fit in with management reform).	The Board notes the Administration's response and considers the recommended action to be under implementation.		X		
22	2017	A/72/157	80	The Board recommends that the results of the e-procurement pilot be expeditiously analysed and taken into account when implementing e-tendering for all applicable items.	**This recommendation is in progress.**	The Board notes the Administration's response and considers the action under the recommendation to still be under implementation.		X		
Total							**12**	**7**		**3**
Percentage							**54**	**32**		**14**

Annex II

Umoja workplan for 2018

Updated Umoja schedule and workplan, as of March 2018



a Phased implementation in 2018 and 2019 to ensure appropriate business readiness (including material master data management) and significant change management in all active peacekeeping and special political missions (see A/72/397, para. 60).
b To mitigate change management risks, deployment will be phased by clusters of entities in 2018 and 2019 (see A/72/397, paras. 65 and 73).
c Planned deployment by the end of 2018 will depend on how the business requirements match the functionality of the defence force planning module (see A/72/397, para. 84).